THE IRON AGE — July 12, 1934

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RYERSON STEEL SERVICE

... THE IRON AGE ...

JULY 12, 1934

ESTABLISHED 1855

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The New Chart May Show Old Landmarks

THE mariner is able to steer a course and make port because he has a tested chart and compass. The North Pole does not shift overnight, nor do the continents change position.

Business is a good deal like navigation. Managements, like mariners, are frequently confronted with the unexpected. Heretofore, however, there have been certain basic rules of business conduct which have permitted the general planning of the course of a business.

Today, even these rules do not stay fixed. The winds blow from too many quarters at once. Unlike the ocean winds, these do not dispel the dense fog which prevents us from taking the customary business observations. And the points of the compass are being changed with perplexing frequency.

Industry accepted the NRA as its master sailing chart. It has found that it could get along nicely under the NRA rules of navigation, if these rules were not changed so frequently by other bodies.

Official interpretation of Section 7-a, for example, has veered North, East, South and West. No manager knows just what it is today or what it will be tomorrow.

Industry signed codes, raised wages, shortened hours on the official premise and promise that the anti-trust laws would be relaxed to permit price stabilization. This basic idea, too, is gradually boxing the compass.

Elimination of price cutting was a professed fundamental of NRA, yet now we find Uncle Sam encouraging price cutting under a new executive order.

In other words, industry does not know how to set its course with a reasonable expectation of being able to hold it.

Most, if not all, of these disconcerting changes have come from without, not from within NRA. There have been too many volunteer steersmen, in Congress and elsewhere.

Some may fear that we face another period of uncertainty and unforeseen changes due to the appointment of Mr. Richberg as director of the new Industrial Emergency Committee. His job will be to "make recommendations with respect to relief, public works, labor disputes and industrial recovery."

We do not think so. We believe that is an indication that the President realizes the need for the establishment of a firm coordinated policy that will, as far as possible, dispel uncertainty and let business know where it is at. And the choice of Mr. Richberg, who is a firm believer in NRA principles, is an indication that the final chart may not be an altogether strange one to industry.

▲ ▲ ▲ Car Underframes Made

DURING the war a partially informed enthusiast suggested making cast steel one-piece ship hulls. Obviously, no consideration had been given to the melting and molding difficulties which would have been encountered, but the suggestion did express the hypothetical objective toward which cast steel technologists have been working. In the railroad field, built-up car trucks long ago were superseded by a one-piece steel counterpart, and cast steel locomotive beds with integral cylinders and air reservoirs have ceased to be novelties. This desire on the part of carriers for unitary construction was expressed in the recent ordering by the Pennsylvania Railroad of 500 cast steel flat car underframes. The molding of these underframes is recorded herein and, in addition, a description is given of a one-piece mine car body which heralds similar innovations in the railroad field. That is, if foundry practices can be so revised and improved that an economic yield of metal per unit of molding sand can be obtained, it is entirely within the range of present casting practice to produce one-piece bodies for gondola cars and, as a further possibility, also bodies for hopper cars. Integral cast steel underframes for this equipment are already an actuality. In the near future welded rustless and corrosion resistant steel may compete with cast steel for underframe construction.

▼ ▼ ▼

RAILROADS have often been criticized for not applying established principles of scientific research more fully to the solution of their operating problems, and it has been added that as a consequence progress has often been materially retarded. This accusation is somewhat belied, however, in their early and constantly increasing use of cast steel for a variety of parts for rolling stock. In fact cast steel technology originally received considerable impetus from the demands of railroads and that field is today one of the largest tonnage outlets for steel foundries. This was shown in 1933 when the monthly average of railroad steel castings was 5189 tons or 22 per cent of the total output of steel foundries. In April, 1934, railroad castings exceeded all other types.

About 37 years ago, just prior to the so-called "cast steel era," steel castings first appeared in railroad equipment as a substitute for cast iron. Early in 1890 the first cast steel double body bolsters for passenger cars were produced and applied to Pullman sleeping cars, and in 1900 there appeared the first cast steel side frames for freight cars. This latter construction is now practically standard for all freight car trucks. The first cast steel trucks made for passenger service were placed under Santa Fe cars in 1904. These trucks were of the four-wheel type and had integral pedestals and cast steel equalizers. These features of construction, however, were not used again until about 1918, after which time they came into broad favor inasmuch as improved welding methods had removed objections arising from the repair difficulties in case of accident.

During the period 1908 to 1925 there occurred a steady development of continuously improving designs for cast steel locomotive and tender beds. The mammoth locomotives which evolved during that period used larger boilers, had higher steam pressures and greater piston thrusts than their predecessors, and, in general, kept imposing greater and greater requirements on the machinery foundations and trucks. These operating stresses and the weaving motions in service were extremely severe on even the best riveted and bolted frames, and it was practically inevitable that a unitary type of casting would be developed to meet the increasingly severe service conditions.

This phase of development culminated in one of the largest and heaviest railroad castings ever made. This was the bed for a Union Pacific 4-12-2 type locomotive. The weight was 82,000 lb., it was 64.25 ft. long, and practically all of the foundation below the cab line was incorporated in a single unit.

While developing large one-piece beds, nearly all of which have been built with integral air tanks and cylinders, it was necessary for the foundry and machine departments to solve many complex molding and finishing problems. Now when the castings leave the foundry they are completely machined and drilled with cylinder barrels and valve chambers completely bored and tested hydrostatically. Later beds also integrally embody the rear cylinder heads.

These cast steel frames have all performed satisfactorily in service and their use has resulted in lower operating costs arising from their light weight, greater strength and compactness. In addition, the unitary construction reduces maintenance and repair costs. This may be illustrated by the fact that a general shoping of an engine with a one-piece frame often costs about $3,000 less than in the case of an engine with a built-up frame.

At the present time cast steel trucks are practically standard, and there is little possibility of competition by other types of construction, particularly for freight cars on which the use of cast steel trucks soon becomes obligatory under interchange rules. Even in the modern light-weight streamlined units, such as the Burlington Zephyr, especially designed cast steel trucks are used. For exceedingly light-weight units, however, a variance to this practice is noted, as in the case of the recently completed Pullman Railplane. In this unit both the trucks and main frame are built up of oxwelded chromium-molybdenum tubing in somewhat the

From Cast Steel ▲ ▲ ▲

By T. W. LIPPERT

same manner as standard aircraft fuselage construction.

Advantages of Cast Steel

Cast steel structures are shown above to have gained a distinct place in the railroad field, and it is doubtful whether a fabricated alternative will ever again seriously contend for certain types of car and locomotive constructions. All laps, seams and joints are eliminated in the cast product, and just the required amount of metal can be placed at just the desired sections for optimum strength. The sections are very uniform or change gradually, generous fillets can be applied where stresses change, corners can be rounded and abrupt differences in shape are easily eliminated. This adaptability removes all the localized stresses which usually exist at points where several layers of metal are used in a built-up construction.

In addition to the flexibility of metal distribution, high tensile strength and homogeneity of the metals, cast steel has a considerable resistance to corrosion which greatly extends the useful life of rolling stock. This resistance is partially due to the inherent chemical characteristics of cast steel and also due to the protecting skin of silica which is fused on during the molding process. This characteristic constitutes a large advantage over the usual riveted carbon steel construction, inasmuch as the rivets of the latter type often become loosened and serve as starting points for localized corrosion, thereby resulting in eventual disintegration.

These attributes of cast steel are, therefore, particularly adaptable in the railroad field to the making of trucks because of the complexity of design, compactness and strength distribution demanded. Also, cast steel is superior to plain carbon steel for underframes and locomotive beds. As for weight as compared with the riveted type of construction using carbon steel, it may be generally stated that where equal strength is desired the cast structure is lighter, or where equal weight is specified the cast structure is much stronger.

Of course all of these comparisons are made with the carbon steel hitherto usually employed for underframe construction. On this basis it

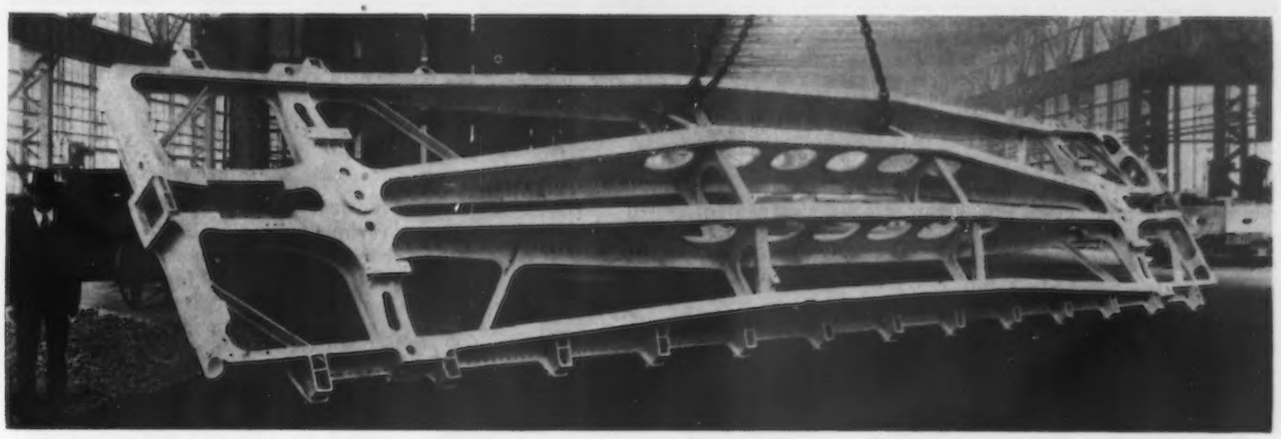


Fig. 1—A completely machined cast steel Pennsylvania F-30-A flat car underframe made by the General Steel Castings Corpn. is shown above. Stake pockets, center plates, bolsters, end and side sills, and center sill with cast in draft gear pockets are all included in this unitary casting. Even the floor board holes are cored and only require final drifting. This underframe weighs 25,500 lb., is 50 ft. long over striking castings, and has a total floor width of 9¼ ft. The overall height of the completely assembled flat car shown below has been reduced 4½ in. as compared with the usual built-up car of this type. The total weight of the car is 50,800 lb., nominal lading capacity is 140,000 lb., and the load limit is 159,000 lb. when concentrated at the two crossbearers located 6 ft. on each side of the center line of the car. The trucks are cast steel with integral journal boxes, and the wheels are single-wear rolled steel.

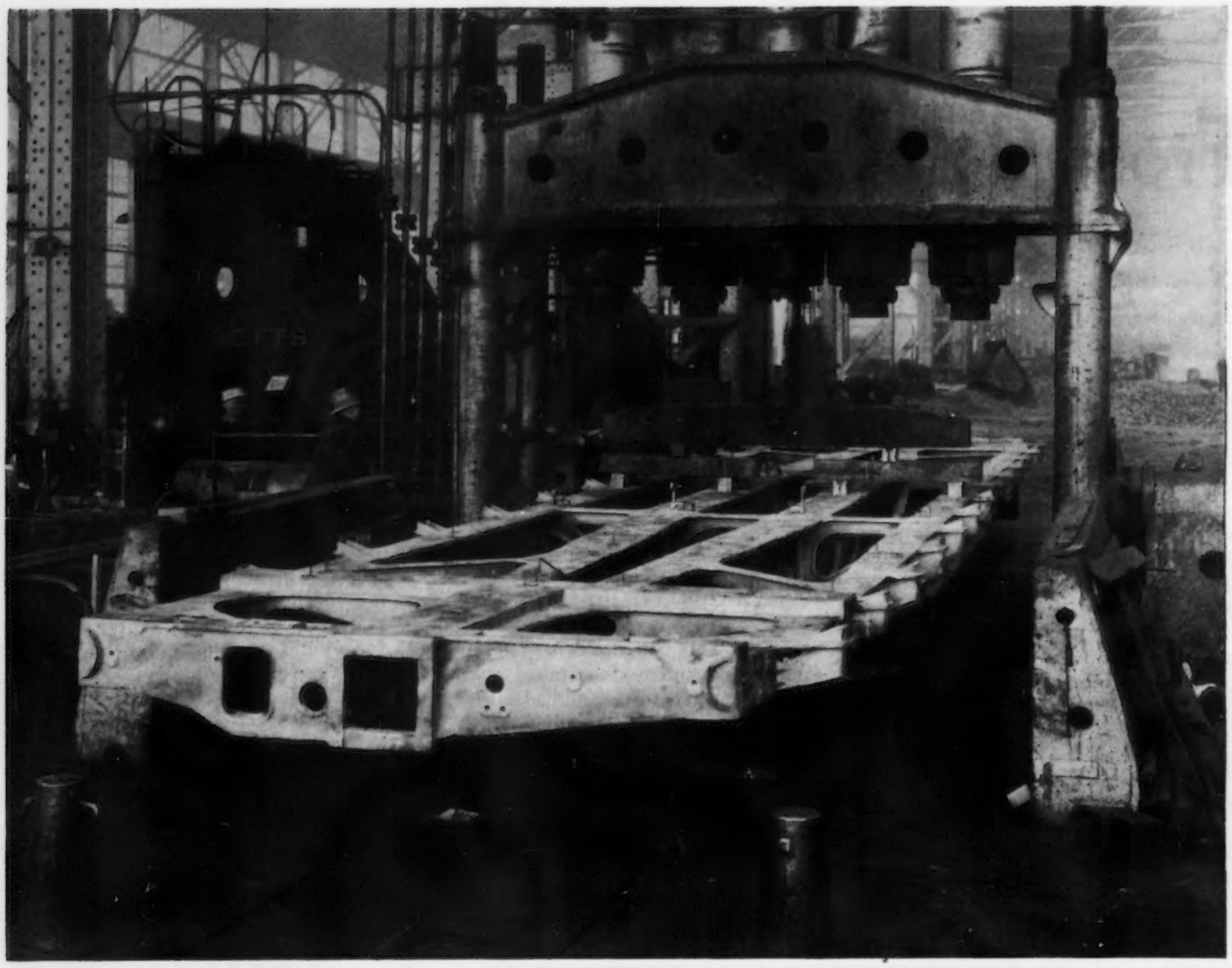


Fig. 2—An experimental check on design calculations made by the General Steel Castings Corpn. The vertical hydraulic press is loading the sample underframe casting 50 per cent in excess of the rated load capacity. The force is concentrated at the crossbearers, and the illustration shows extensometers placed at critical points to measure the deflections. The test results were well within the limits established by Pennsylvania Railroad engineers. The center sills carry their own weight and 74 per cent of the capacity lading, and each side sill carries 13 per cent of the load.

becomes only a matter of time and education before cast underframes would become standard. However, steel mills and the welding fraternity have belatedly recognized this threat and are attempting to produce competitive types of construction.

To compete with cast steel a welded structure must be as cheap and serviceable, and it must be somewhat non-corrosive. A development already made in this direction is the engine bed and forward frame of the Burlington Zephyr, which is of welded Cromansil steel. Also the sample underframes for the streamlined Chicago, Milwaukee, St. Paul & Pacific is completely welded from conventional structural shapes, plates and sheets.

The United States Steel Corpn. is now marketing two new products which may be used in welded underframes. A low Cr-Cu-Si steel and a medium manganese steel have approximately five times the corrosion resistance of open-hearth steel, a tensile strength ranging around 85,000 lb. per sq. in., and a yield point of about 55,000 lb. per sq. in.

So far steel castings can be produced at an advantage when a number of duplications are made, but when only several structures are desired the welded type has an advantage. It is problematical what the future holds forth, as the foundries will probably develop more economic manufacturing methods resulting in a lower priced product, whereas the steel makers may reduce their prices when their output becomes larger.

The above discussion of the growth, merits and competitive advantages of cast steel for underframes leads up to the general casting practices employed. The following description applies to underframe castings made at the Eddystone, Pa., plant of the General Steel Castings Corpn., and the same process is used for molding the even more complex locomotive frames previously described.

Casting Methods for Underframes

Because of the intricate shapes of locomotive, freight and hopper car underframes, as can be seen in Fig. 1, special methods of molding have been developed. One of these consists essentially of a metal form which roughly follows the contours of the underframe inside of which dry sand cores are arranged to form the metal as desired. The complete mold is constructed of hundreds of these differently shaped baked sand cores and the molding procedure is a somewhat grandiose method of bricklaying. The term mold is used descriptively, as no pattern or green sand is employed because of the complexity of the casting. Another method embodies machined molded sectional flasks which inter-engage to form the mold assembly.

Many cores are used in these various molding methods and during their preparation more or less conventional practices are followed, although the General Steel Castings Corpn. has developed special molding and core-making machines for their particular products. The core-making procedure is completely mechanized. Core boxes are carried on a conveyor under a sand distributing machine where they are filled. Nails and iron gaggers are inserted in various places for strengthening, and the core is first mechanically rammed and then stripped. The conveyor carries the stripped cores to a continuous baking furnace from which they emerge with a brick-like degree of hardness. The individual cores naturally vary in size and their shapes suit the various sections of the underframe. In this molding practice practically everything is reclaimed. There is a dedusting and remilling system for the used sand, and all metal particles are separated magnetically. A little new sand is added to the old before it enters the tempering equipment.

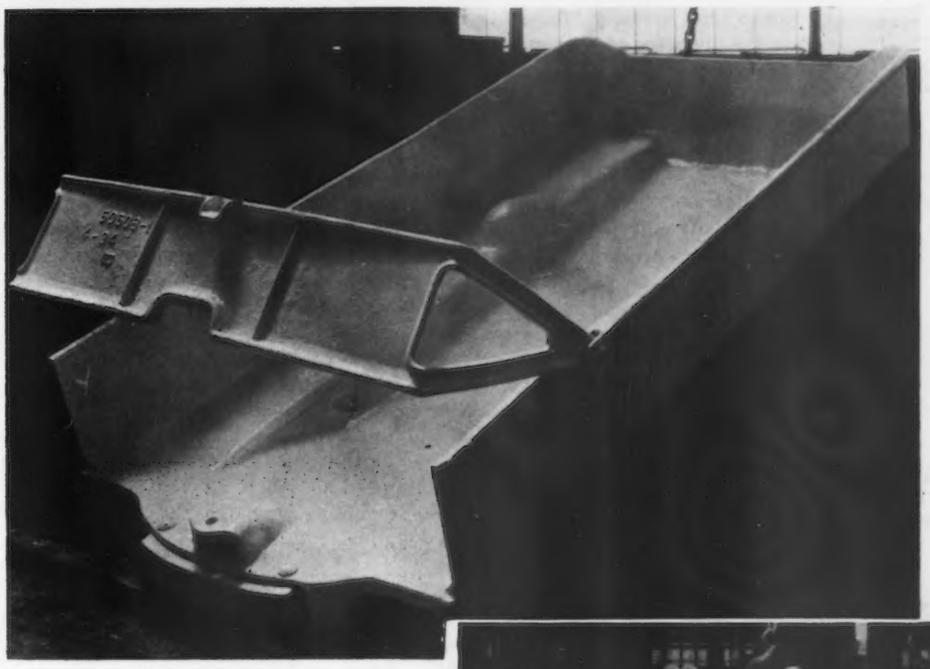
The cores are placed against and on top of each other and are adequately supported in the molds. Where metal is to form, separation is made by metallic spools or chaplets. In addition all core cracks are pasted up on the outside with fireclay to eliminate fins.

The metal is poured at about 3000 deg. F., and the buoyant forces acting on the cores during pouring are very large. Therefore the cores must have a smooth surface finish, have sufficient strength at the high temperature to withstand the pressure of the molten metal, and a number of clamps must be provided to prevent core movement during pouring. The underframe in Fig. 1 is poured right side up. The metal enters the mold through one gate and is distributed throughout the mold from one runner along the bottom from which it rises between the cores to form the shape of the casting. The completed process finds the metal at the top of each of the various risers located in the upper part of the mold. Three underframes are poured in one heat and each mold is filled in about 1 min. pouring time. During several succeeding minutes additional metal is added to take care of shrinkage due to cooling.

At the General Steel Castings plant oil-fired basic open-hearths are used to melt the steel. The charges consist principally of pig iron and carefully selected scrap, and a single heat may weigh up to 80 tons.

The steel as poured has a carbon content between 0.15 and 0.20 per cent, and other elements analyze at not over 0.06 per cent phosphorus and

(Concluded on Page 84)



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The initial cost of this body is slightly higher than the regular type, but the expense is economically justified because of the greater resistance to corrosion and superior operating characteristics due to the unitary construction. The capacity is four tons with a water-level volume of 127 cu. ft. The car is 11 2/3 ft. long inside, 6 ft. wide, and the recessed wheels effect an overall height reduction to 30 in.

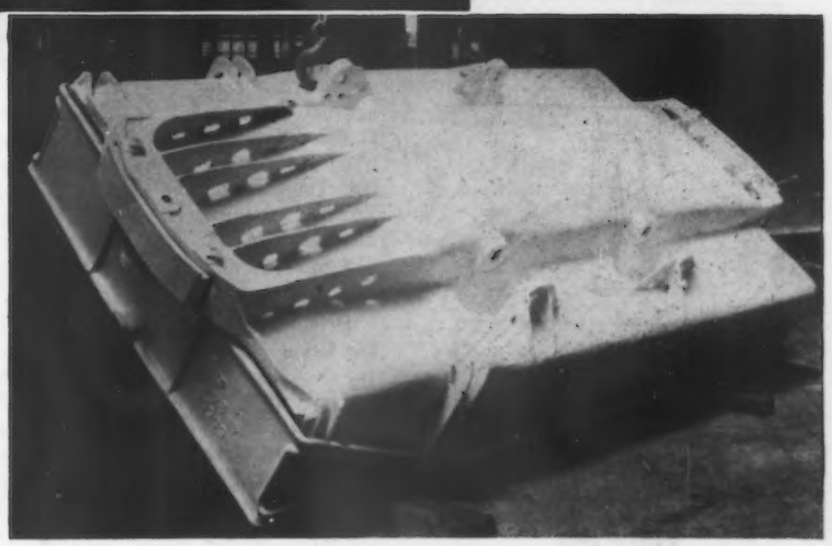


Fig. 3—This one-piece mine car casting is finding great favor with mine operators and was made for the Jewell Ridge Coal Corpn. in the Virginia smokeless fields. The entire car body is cast in green sand complete and before installation, it only requires the addition of four axle bars, roller bearings, and cast steel wheels. A large weight saving per cubic foot of bituminous coal capacity is secured when compared with the conventional iron and wood type.

▼▼▼

Assembling Economies Made

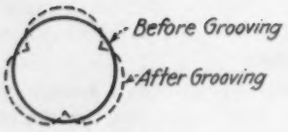


FIG. 1
A section of a rod before and after grooving, showing the way the metal between the grooves is bulged out to greater diameter.

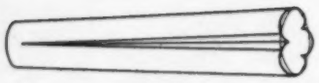


FIG. 2
In the standard Groov-Pin the groove is deeper at one end. This is an exaggerated sketch to illustrate the principle.

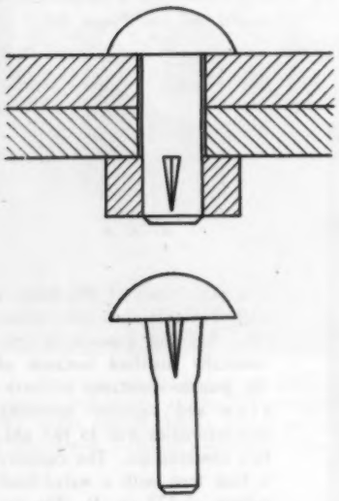


FIG. 3
This shows a standard drive-stud with the groove portion exaggerated and an application of a special type of drive-stud used as a rivet.

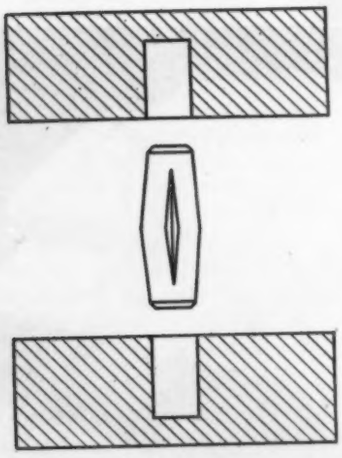


FIG. 4
A double grooved pin may be used to make a concealed joint between two plates or parts.

IF longitudinal grooves are pressed into a cylindrical metal pin, the metal thus displaced, which must go somewhere, actually "flows" to increase the diameter of the pin between the grooves. This is shown in exaggerated form in the section at Fig. 1 where the full-line circle represents the pin before the grooves are pressed in it, and the dotted lines indicate the shape after grooving.

From this it will be evident that if the grooves are pressed deeper at one end of the pin, the pin diameter between the grooves will be greater at that same end, and the pin, instead of being cylindrical, will be tapered as illustrated in Fig. 2. However, there is a marked difference between such a tapered pin and the familiar solid taper pin, because the metal which has been pushed out in the groove pin will, under pressure, flow back to again fill the groove space. This means that the groove pin may be driven into a straight cylindrical hole and that when thus driven, the pressure of the metal of the pin against the wall of the hole will be great enough to hold the pin in place against a strong effort to remove it. If the effort to remove it is increased until the pin is actually forced out, both the pin and the wall of the hole (under proper conditions of design and materials) will be uninjured, and the pin therefore can be used over and over again.

Briefly, this is the theory back of the Groov-Pin enterprise as developed in this country by the Groov-Pin Corpn., at Long Island City, N. Y. This company makes many different designs of Groov-Pin and uses many different metals to meet the diversified assembling needs of the metal working industry. For instance, the groove need not be at the end of the pin, and the pin may have a head and thus be used as a stud or rivet, as shown in Fig. 3.

The standard Groov-Pin is made of high tensile steel with three equally spaced and tapered grooves which are deep at one end of the pin and disappear a short distance before the other end. Such a design of pin is used for, and has been found adapted to, joining parts of automobile assembling. It has been used successfully to fasten the brake lever to its shaft, to anchor springs, to key gears, and to fasten the pedal shaft assembly. Modifications of the standard type have been used in dozens of other applications in the building of automobiles, and it is said that one of the popular cars has been able to save as much as 75c. a car in assembling, through the use of Groov-Pins.

Resists Vibration

When used to replace the standard taper pin, the Groov-Pin is said to have much better holding power, especially when subjected to vibration. The taper pin, when once slightly loosened, will fall out, but the Groov-Pin has practically its full holding power over a range of perhaps half an inch of movement. Tests were made at the Sage Laboratory of New York University, to determine the holding power of Groov-Pins under various conditions. Two ⅜-in. steel plates were fastened together by means of three standard Groov-Studs, and the resultant assembly was placed on a concrete slab and subjected to a vibration test with an electric hammer for more than 100,000 oscillations. This was such a severe test that the steel plates themselves were nearly

With New Drive Pin

By HERBERT R. SIMONDS

Saves 75c. a Car

THE taper pin is common in industry as a means of connecting concentric parts such as hubs and wheels, but the taper pin fits a reamed taper hole, while the grooved pin here described fits a straight hole and thus no reaming is required.

Its range of application extends far beyond that of the taper pin, and its chief advantage comes through the reduction in assembling costs which it makes possible. With it, one automobile manufacturer reports an assembling saving of 75c. a car.

destroyed, but the report of the test states: "The Groov-Studs altered their position not more than 0.007 in., and the holding power of the pin under severe and extended vibration was shown to be remarkable."

At the plant of the Groov-Pin company, large automatic machines accurately press grooves into cold drawn bars, and the company states that the successful application of its pins is dependent upon precision in manufacture. The grooves must be uniformly tapered with respect to one another, so that when driven in place the outward pressure against the wall of the hole will be uniform and will thus keep the center of the pin concentric with the center of the hole.

Applications Are Varied

At one of the largest textile machinery plants in the country, it is customary to join rolled steel parts to machine frame castings by means of one through-bolt and two Groov-Pins at each joint. The through-bolt facilitates the initial assembly and the Groov-Pins then serve the double purpose of accurately alining the parts and making the joint firm. In this case, however, the chief reason for using the Groov-Pins is to facilitate reassembling.

When an ordinary bolted joint is reassembled, it is exceedingly difficult to get the perfect alinement necessary in certain textile machines, as, for instance, a carding machine where a variation of 0.001 in. is serious. When Groov-Pins are used they automatically aline the joined parts as the pins are driven in place. One interesting type of joint makes use of a short Groov-Pin with two sets of grooves joining at the center, as shown in Fig. 4. In this case both ends of the pin are left free from grooving, and the pin may then be used to join two plates as indicated. In this case the pin is hidden after the plates are pressed firmly together.

A small Groov-Stud is useful for fastening name plates and description plates on machinery in the manner shown in Fig. 5. Similar studs are used for fastening linings to metal such as asbestos linings on coke oven doors, formerly fastened with screws, or brake linings to brake bands, formerly fastened with rivets.

When used to replace cotter pins, the Groov-Pin is said to have safety advantages in that it does not extend beyond the nut and is stronger. Groov-Pins are used in agricultural and road building machinery, in building hardware, as, for instance, door hinges.

Special Shapes Used

When the design is such that one end for a considerable distance is free of grooving, the pin may be used as a dowelling pin for alining parts of molds or parts of die blocks. Such an application is shown in Fig. 6. The familiar automobile window handle knob gives an interesting use of a special shape of Groov-Stud. Here the stud with a flat head is inserted through a slightly larger hole in the handle bushing, leaving the groove portion of the stud extended. The drilled knob is then placed over this extended portion and driven into place to complete the assembly. This is shown in Fig. 7.

FIG. 5

Name plates on machinery are conveniently fastened with small Groov-Studs.

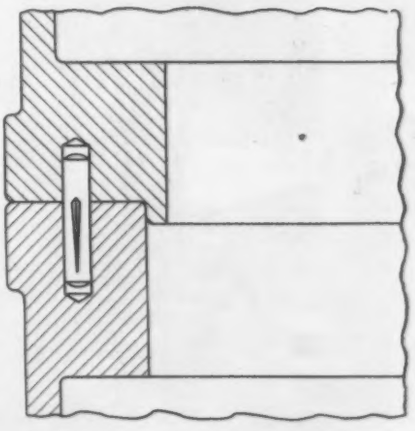


FIG. 6

Dowel-pins for foundry flasks and other similar applications are conveniently made with Groov-Pins.

FIG. 7

An ingenious and inexpensive method of fastening the revolvable knob on the end of an automobile window handle is here shown.

▲ ▲ ▲ Wire Drawing at the

DRAWING copper wire at speeds of 6000 ft. per min. and higher is accomplished with accuracy on the modern drawing machines of the Belden Mfg. Co., Chicago. The process is a radical departure from the old-time bench and straight roll method. This article describes the process of wire drawing in one of the most modernly equipped plants in the country.

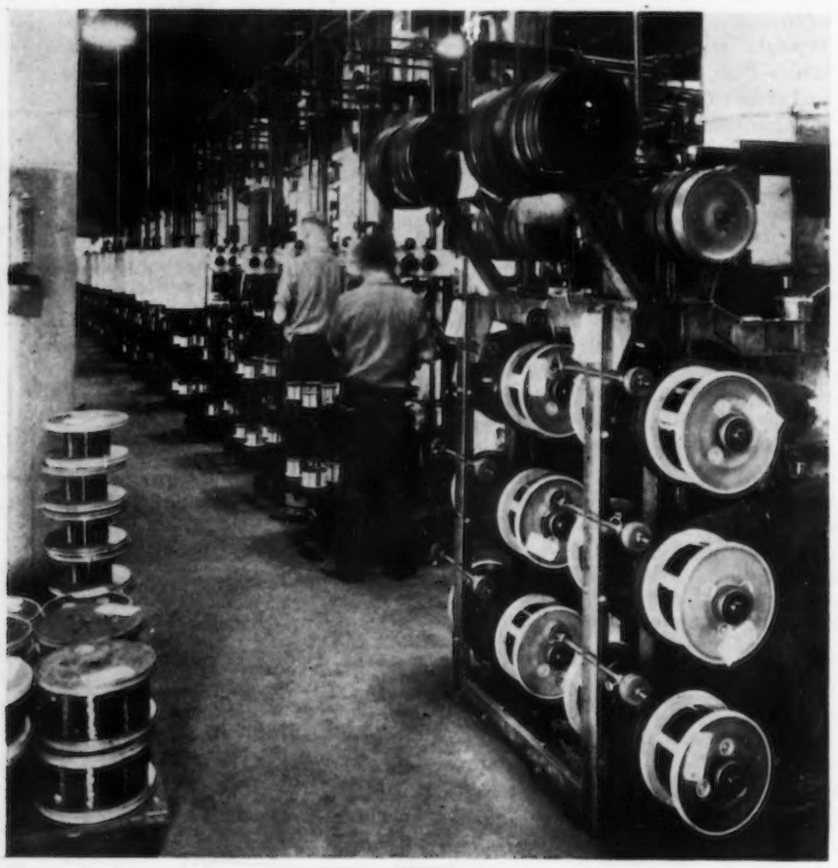
IN these modern times great industries are built on small things. Fine wire is one, insulated cords another and electric plugs a third. The manufacture of these three items is now combined in the plants of the Belden Manufacturing Co., Chicago. This concern conceived the well-known soft rubber plug, one of the outstanding developments in this industry in a number of years.

The company has two plants, one in Chicago and one in Richmond, Ind. The Chicago plant is housed in a huge, modern building and here is drawn wire of all finenesses, which is then made into magnet wire and into conductors which are used in the Richmond plant to make rubber-covered wire and rubber plug cords. This concern supplies wire to every industry that uses the gages made. Raw material comes in the form of 5/16-in. copper rod in coils and this is drawn down to the finer sizes in modern mills as follows:

1. Rod mill ..... 15 ga.
2. Intermediate machines ... 26 ga.
3. Fine machines ..... 46 ga.

The product of the rod mill is drawn in multi-die, progressive wire drawing machines equipped with five to nine dies each. Speed of drawing has been increased right along in recent years until 6000 ft. per min. is now easily accomplished, while at this plant much higher speeds have been experimented with. Alloy steel dies are used for the larger gages and diamond dies for the finer gages and for finishing. The care with which these dies are designed and made is of tremendous importance in attaining high speed drawing.

The design of the modern drawing machine is a radical departure from the old-time bench and straight roll methods. The modern step cone rolls with from 13 to 16 dies, all compacted in a small space and enveloped in a light steel case to permit constant and liberal lubrication. An upright steel base holds the dies and the wire loops back and forth on two-step cone roll series. The step cone rolls reduce slippage, due to the gradual lengthening of the wire, to a minimum. Each time the wire passes through a die its length is increased, the linear travel of the wire is increased and either the size or speed of the next roll must be increased to take up this extra length. In order to make one shaft and one motor do for one set of rolls, their size is stepped up instead of their speed.



One of the many rows of wire enameling machines and vertical gas fired dryers. ▼▼

The perfect machine would have no slippage whatever. Theoretically the difference in lineal speed between gages is 26 per cent, but in a practical machine somewhat less is allowed for in part to compensate for variations in die diameter and roll size. In this plant there are countless batteries of these wire-drawing machines which operate at such great speeds that they are partially submerged in lubricating solutions and these lubricants are constantly sprayed onto the exposed sections. An operator with a gas torch brazes one spool of wire to another, as the machines use it up, so as to obviate the necessity of rethreading the dies.

Annealing is accomplished in insulated cylindrical steel furnaces, heated with gas burners and filled with a non-oxidizing atmosphere in the form

Higher Speeds ▲ ▲ ▲

By J. B. NEALEY
American Gas Association

of steam. These furnaces are each 7 ft. high and 4 ft. in diameter and inverted over a tank of water, the water level rising just above the lower edge so as to form an air seal. Located in this tank is an hydraulic lift, with an arm and circular platform of the same diameter as the furnace. The platform is swung around and raised to a hole in the floor, just in front of the furnace, loaded with spools of wire, submerged, swung around through a half circle and raised so that the wire is inside the furnace. Four gas burners fire into this furnace from opposite sides and close to the bottom. The steam is forced in at the top.

Wire that is not annealed is dried in an insulated steel oven 12 ft. long and 4 ft. in cross section, which is provided with a separate gas-fired heater. Spools of wire on steel racks handled by lift trucks are charged into this dryer through a series of steel doors in one side. The heater is of the drum type, with a single gas

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One of the gas fired tin pots with a setup of spools at one end and motor driven reels at the other.

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Row of high speed multi-die, progressive wire drawing machines with covers removed to show dies, step cone rolls, etc.

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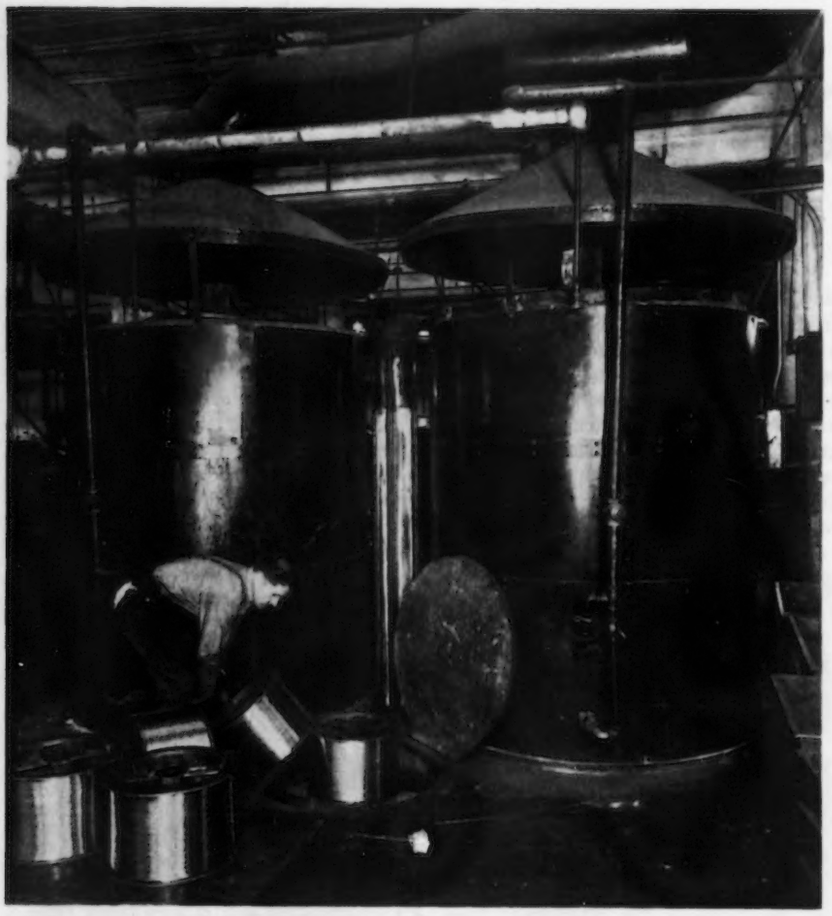

Annealing furnace showing wire being loaded onto submerging platform. ▲ ▲ ▲

burner in one end. The hot products of combustion are forced out at the other end, through a flue into the dryer, and after they circulate through the dryer they are sucked back into the heater, where they are reheated for recirculation. There is an automatic temperature control actuating a motor valve in the gas supply line.

For wire to be tinned, there are long rows of gas-fired tin pots with fixtures for holding spools and motor-driven reels for rewinding. In this manner the wire from nine or ten spools is pulled automatically through the molten tin. On the entering side of the pot, however, is an acid bath through which the wire must first pass, while on the other is a tank of cold water for cooling the wire prior to rewinding. These tin pots are about 12 in. deep, 18 in. wide and 3 ft. long and each is heated with a number of gas burners. The operation is carried on at a high rate of speed.

Wire enameling is accomplished in long rows of automatic machines and the product of this division of the works is probably one of the best enameled wires in the world. Each machine consists of a tank of enamel and two sets of pulleys, one in the bottom of the tank and the other from 5 to 12 ft. above, acccording to the size of the wire. The number of pulleys depends upon the number of coats the wire is to receive and the number of wires to a machine. The wires running vertically between the pulleys are enclosed in a steel case which forms a baking oven and is heated by gas burners.

Successive coats, depending on the number of passes, are thus put on and baked on, and the enameled wire rewound on spools continuously and automatically. Waste heat from the baking ovens is exhausted through a stack in the top.

The silk and cotton-covering division is provided with long lines of machines for performing this operation automatically, continuously and at a high rate of speed. Spools of cotton or silk, as many as there are thicknesses of covering to go on, are

(Concluded on Page 80)

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A "concentric cabler." One of the wire stranding units.

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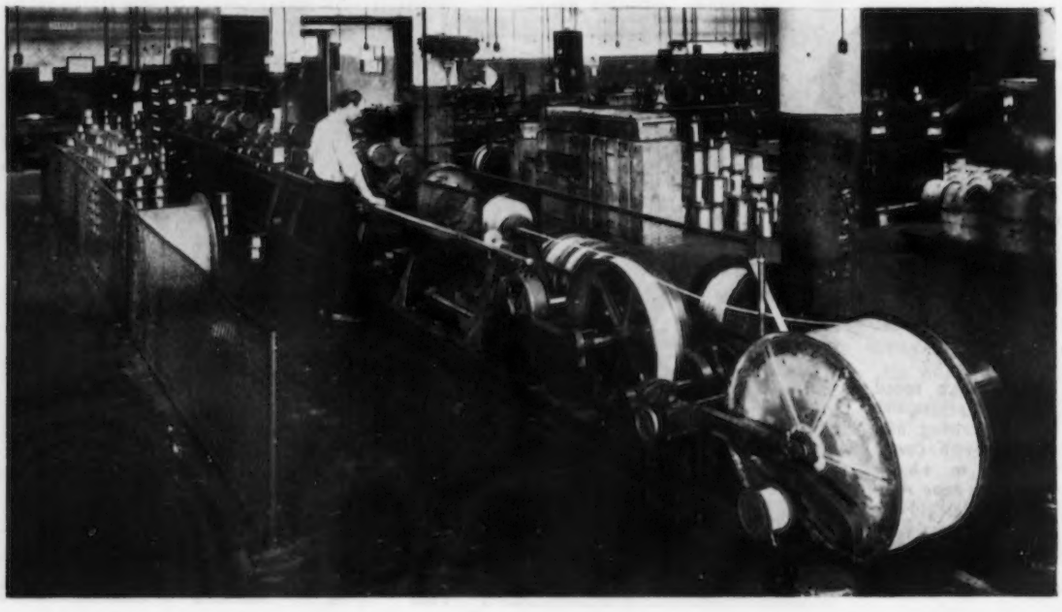


Foundries Accept Welding and Aim For New Goals

By HERBERT R. SIMONDS

ROLLED steel and castings may be advantageously welded in the design and fabrication of the major portion of present-day heavy machinery. This is the opinion of practically all those questioned on the subject of welding in the foundry industry. For mass production of smaller parts, authorities seem to differ, but all agree that welding as a tool in the foundry industry is now an established and essential feature, and that the future will bring the welder and the foundryman closer together in the solution of many fabricating problems.

The experience of the Bucyrus-Erie Co., Milwaukee, furnishes an excellent example of welding in combining castings and rolled steel parts on large work production. The accompanying illustrations show parts of a welded dipper used for stripping the overburden from coal. The bucket shown in one view has as part of its structure a 11,000-lb. casting forming the digging lip, with structural members forming the bottom half. The casting is of nickel chrome molybdenum steel. The dipper handles shown in the other photograph weigh over 30 tons, and also are built up of castings made from basic open-hearth steel and also from nickel chrome molybdenum steel. There are 14 rack castings used in the assembly of the handles. A 15-ton open-hearth furnace was used for melting the metal. The complete unit spans a 60-ft. arc.

Welding enthusiasts in the early days saw a use of welded structural steel and rolled steel parts which would largely supplant castings for such heavy members as machine tool beds, press and hammer frames, and parts of heavy generator equipment, and, as a result of this enthusiasm, foundrymen were inclined to regard welding as a competitive art, and it has been only within recent years that its acceptance as an aid to foundry work is being fully realized.

P. J. Horgan, of the General Electric Co., has pointed out that the first contact the foundryman had with his order for castings was the presence of patterns and core boxes at the foundry door. His training had been to find ways and means to produce castings from patterns as they appeared, for he assumed that the engineer and the pattern maker were conversant with what was wanted. His job was to produce better molds, finer grained metal, and sounder castings.

Then along came the welding engineer and designed an alternative for castings, and, in so doing, broke away from tradition which had long muzzled inventive genius and design in the foundry art. As might be expected, the welding engineer swung the pendulum too far toward the exclusion of castings, but in his work he indicated to the alert foundryman the design fundamentals required, and has thereby helped him to analyze his own fabricating methods. The result has been an increase not only in insight but in confidence on the part of the foundryman, and he has had the courage to go to designers and point out the many advantages of combining castings with rolled steel. In fact, the progressive foundryman of today is invading territory which for many years has been enjoyed exclusively by fabricators of structural steel.

Other General Electric engineers interested in foundry work have expressed the opinion that the early, vague fears that welding would cause a decrease in the use of cast steel products have now largely subsided. A recent investigation shows that instead of being regarded as a menace, welding processes are considered as a logical complement to the foundry art. During the past few years much electrical machinery,

ARE castings coming back? This is a question of lively interest throughout industry today. Many close students of the foundry problem feel that the pendulum has turned, and that we are now embarked on an ascendency period for castings.

Certain it is that conditions among foundries are more hopeful at present than they have been for many years. Most of the kinks and prejudices which entered the art of casting along with the advance in welding, forming, and die casting, have now been ironed out, and the foundry with better materials, better equipment, and far greater self-confidence, seems set to take a more prominent place in the future fabrication of metals than it has occupied since the war.

Instead of fearing welding as it did at first, the foundry now accepts it as a tool and is ready to use it for its own advantage and for the good of the metal working industry.

The accompanying article is essentially a symposium of opinion resulting from a questionnaire submitted to a representative group of foundrymen, welders, and equipment manufacturers.

which was redesigned for construction wholly with welded rolled material, is again being redesigned to use a combination of steel castings and rolled shapes. T. S. Quinn of the Lebanon Steel Foundry, Lebanon, Pa., says: "If and when consumers of steel castings come to view the welding of castings as they do the welding of fabricated parts, then I think we can expect to find a new impetus given to the use of castings, which does not exist at this time."

Most of the difference of opinion about welding in the foundry field comes in the realm of fabricating methods, and there is general agreement that the use of welding to repair defects is a godsend to the foundryman. One authority, however, cautions against an over-reliance on welding for repairing defects. He says there is danger of gradually slipping into a lower quality of castings, on the assumption that any defects, which might appear, could very easily be repaired by welding. On this particular point Mr. Horgan states: "All welding of defects in our castings is done with the approval of our apparatus engineers. The study of fabrication by welding has greatly liberalized many engineering decisions toward castings that can be salvaged by welding. This study has also indicated to foundrymen changes in design which can be incorporated to their advantage by increasing the uniformity and reliability of their castings at reduced cost."

R. A. Bull, consultant on steel castings, Chicago, some time ago stated: "The steel foundryman happens to occupy an interesting position in respect to the exploitation of welded assemblages. He not only is able to use fusion welding advantageously for eliminating slight defects, but he knows of the benefit which would come if his repair welding could be made equal, in strength and fatigue resistance, to the original casting. Steel foundrymen frequently supply cast steel parts which are to be joined to wrought iron parts for fusion welding, where such composite construction produces the most economical complete unit. Thus the steel foundryman is in a position to cooperate closely with those who advocate welding."

Designing for Castings

"Welding has not only helped to make foundrymen design-minded," according to Mr. Horgan, "but it has caused an appreciable reduction not only in cost of patterns and foundry equipment, but in the weight and cost of castings. The days of the old school are over when the foundryman just said, with an attitude of finality, 'We will make it this side up,' and the pattern maker proceeded to make him a pattern irrespective of cost of pattern or casting. The threat of competition of welded structures as an alternative to castings has helped to make the foundryman a better engineer."

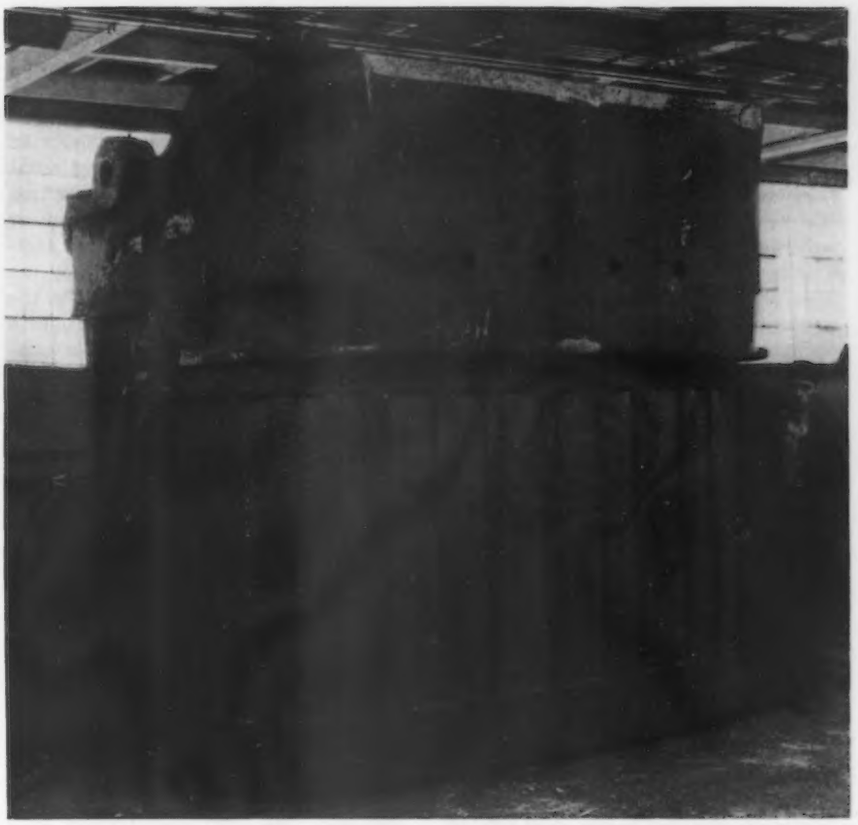
Mr. Horgan, in a paper on the subject of "The Engineer, the Welder, and the Foundryman," has enlarged upon this thought, and his comments so closely accord with the consensus of opinion in this investigation that his paper is quoted at some length as follows:

"The designer of today, then, in order to reason logically whether he is to cast or to weld, must be conversant with the material and labor costs of both methods.

"To make a casting we first must have a pattern. Patterns may be simple templates, sweeps, strikes, etc., requiring skilled molding knowledge and labor. And then they may be block patterns mounted or unmounted on boards or metal vibrator or match plates to suit the modern machines for jolting, squeezing, pattern drawing, etc. The amount of money put into a pattern is directly proportional to the expected production and quality of casting desired.

"The former practice of a molder spending five minutes drawing a pattern and then using up an hour in patching his mold is rapidly being replaced by up to date pattern making with the parting line built into the pattern itself to take full advantage of the machine equipment at hand, reducing labor costs to a minimum. The substitution of cores for drawbacks and sundry tell-tales are but simple examples of the progress of the cooperative efforts of the pattern maker and foundrymen.

"To make a mold we must ram, jolt, squeeze or sling sand into the flask around the pattern; patch, butt-off, or reinforce the mold where necessary; set cores, close the mold, cut gates, pouring basin, etc.; all of which represents molding labor. To this, of course, we must add labor of sundry adjacent operations such as making cores, cleaning, and snagging. The amount of foundry labor in each case depends upon the complexity of the pattern and core boxes, and the facilities for handling the flask, the sand, and withdrawing the pattern.



THE bucket at the right and the handle at the left are parts of a 60-ft. arc welded dipper used for stripping the overburden from coal.

"Gray iron in the molten state ready to pour into a mold costs on an average 1¼c. per lb.

"To arrive at the cost of a casting, then, we should know the weight of the iron, multiplying it by the cost per pound at the spout, add thereto the individual labor prices for the foundry operations, and then the necessary indirect expenses commonly called overhead. The author wishes to stress this last item since he has seen incorrect fabricating savings in the journals of the welding trade where overheads on welding were omitted on the basis that castings were material only, whereas castings do involve the three items of material, labor, and overhead.

"Molten steel at the open-hearth spout is of the order of 1½c. per lb. Labor in the steel foundry is comparable with iron practice except that allowances must be made for the added precautions for handling hotter metal, more headers to feed the casting, and more work actually performed in cutting risers, cleaning, and snagging. Extra expense also reflects in the overhead incident to a larger amount of dry sand molding.

"Cost of non-ferrous castings in bronze or brass depends upon the amount of copper, zinc, lead, and tin used.

"The use of steel plates and structural shapes has been greatly enhanced by the rapid improvements in our facilities for welding, a greater respect by designing engineers for the welding art in general, and a desire to take full advantage of any ways and means to reduce costs.

"Boiler plate or steel shapes cost about 2½c. per lb.

"In cutting plate with oxygen and acetylene, hydrogen or city gas, we not only have the factor of 25 to 40 per cent scrap because of the relation of the various contours to the rectangle of the plate itself, but also the cost of the gases which are practically 100 per cent of the direct labor in doing the cutting.

"The direct labor prices involved in getting shapes ready for welding, using the conventional rolling, bending and flanging machinery, are well understood.

"Precise data on the cost of the welding operation itself, while fairly well established in individual factories, are still in a state of flux. The time permitted for watching the arc varies from 40 to 80 per cent. Allowances for fatigue depend upon local conditions.

"The amount of heat which can be applied depends upon the nature of the structure to keep distortion at a minimum. One pound per kw. hr. of energy seems to be recognized as the correct basis of calculation for metal deposited by the electric process.

"To determine the cost of a fabricated structure, then, we must start with the cost of the plate, add percentage for scrap, then direct labor costs of forming, gas cutting and welding, plus indirect expense."

Welding Equipment in the Foundry

In order to coordinate welding operations with the general scheme of casting production, the Bucyrus-Erie Co. divides its welding work into two units, one for fabricating smaller work, and one for larger work. The shop has five electric furnaces, with a total capacity of 500 tons a month, and makes extensive use of heat treating after welding, to give maximum strength to the fabricated product.

The Lincoln Electric Co., Cleveland, which has given a good deal of attention to studying the appropriate equipment for a small foundry, recommends as minimum equipment a 300-amp. welder of the shield arc type. The Lebanon Steel Foundry states that for a small jobbing foundry with a capacity of not much over 5 tons a day, two welding units would usually be advisable. These, the company feels, might be small-sized metallic arc welding units. A third machine with a carbon arc is valuable at times for cutting out sections in a clean manner to permit of subsequent welding. Mr. Bull feels that a motor generator welding set, or a small oxy-acetylene set, or perhaps both, would be advisable for a small steel foundry. He states that welding is desirable, and almost universally used, for eliminating small surface defects in steel castings.

A group of foundries was asked for some expression of their experience with welding castings to rolled steel. The Lebanon foundry is of the opinion that the jobbing foundry will have comparatively little work of this character. It gives the reasons for this as follows: "Where castings

and rolled sections are put together, the weight of the rolled sections usually predominates. This throws the work into a fabricating shop, and the only chance the foundry has to compete with this is to furnish a complete steel casting, as such, to compare with the fabricated assembly. We regularly furnish steel castings to welding shops who combine them by welding in their fabricating assemblies. This has developed into quite a nice specialty with us, and we cooperate with the welding shops to the end that they will use as much of our product as is justifiable."

Welding Simplifies Practice

Some foundries use welding regularly to simplify their molding and casting practice. That is, they divide large complicated pieces into several parts, cast these separately, and then weld them together to make the complete product. Some difference of opinion, however, is expressed on this process. One foundryman states: "I do not believe there is a field for joining by welding sections of large complicated castings. When designing castings to be joined together, provision can be made for bolting and stud flanges. It must not be overlooked that the purpose of casting many pieces in sections is not to reduce the difficulty of large one-piece work, which is not always so serious in foundries which understand their business, but is to facilitate the assembling of parts that go inside these pieces, and to provide for future disassembling. An illustration of this is the familiar centrifugal pump casting. We could cast pump castings and cap integrally, if desired, but how would you get the impellers in and out?"

Another company states: "Welding for joining sections and making completed castings has been used in a number of cases. However, this is not general practice, and the opportunities for making savings in this line are not recognized as fully as they might be." Mr. Bull answers this question in the affirmative. That is, he feels that welding is used to a considerable extent for joining sections of complicated castings.

W. H. Namack and H. M. Hobart have analyzed this question rather carefully for the General Electric Co. On the assumption that a complicated casting would cost 10c. and a simple casting would cost 6c. per lb., they follow through a typical comparison. They state:

"Any suitable number of simple and cheap steel castings, properly joined by arc welding, will be in every way as satisfactory as the usual single casting of steel. Indeed, shapes and features may be incorporated in a welded structure which, in a single casting, might be impossible. In some cases the complication of making the product with a single casting, and the limitation of the casting process, will result in the single casting having a greater weight for the required strength than would be the case with an equivalent structure made up of two or more simple castings, each devoid of expensive complications, and all welded together. A designer should keep the cross-sections of his castings as homogeneous as possible, and he must also avoid sudden variations from heavy to light sections. These are but two of the many limiting factors encountered in molding practice on complicated work.

"Assume that a single complicated casting weighs 1000 lb. and that it costs 10c. per lb., or $100. An equally strong and satisfactory structure may be produced by welding together several simple castings costing, say, 6c. per lb. and weighing in total only 800 lb. The total cost (before they are joined by welding) in this latter case is $48. It can be assumed that the cost of joining the component castings is $16. Then the total cost will be $100 for the single casting and $64, or 8c. per lb., for the multiple casting part."

In this assembly, which the authors feel is not at all exaggerated, the total weight has been reduced by 20 per cent, and the total cost, by 36 per cent. In this same investigation Mr. Namack and Mr. Hobart describe another phase as follows:

"In the matter of large mild steel castings weighing many tons, the practice of arc welding has now reached the stage where equally great strength may be obtained by welding together any number of castings of whatever size and shape correspond to the lowest cost. It is in very large castings that there is the greatest probability of blowholes, sponginess, and other defects, and that the cost and delay of rejections are most serious. The loss and delay in rejecting one or two small castings out of a considerable number are far less than that of rejecting a single large casting. Also, in cases where it will decrease the cost, the small castings can be machined on less expensive tools, several at the same time, and not welded together until all or a great part of the machine work is done. There is thus the hazard of rejection of only a relatively small part in the event of the development of any defect, with a decrease or elimination of delays."

Charles H. Jennings, of the Westinghouse Research Laboratories, says that in order to obtain maximum efficiency in the design and construction of welded machinery, it is often desirable to incorporate into the design both rolled and cast steel parts. Feeling that more research work in the field of welding castings was desirable, he made a series of tests, with the following conclusions:

1. Cast steel (of the composition used in this investigation) can be successfully arc welded to cast steel or hot rolled low carbon steel by means of bare and fluxed electrodes.
2. Welding on cast surfaces is not harmful and the results obtained are approximately equal to those obtained from welds made on machined surfaces.
3. The average tensile properties obtained from welds made on various combinations of cast and hot rolled low carbon steel are as follows:

TYPE OF JOINT	BARE ELECTRODES	FLUXED ELECTRODES
Fillet welds	64,300 lb. per sq. in.	75,000 lb. per. sq. in.
Butt welds	63,000 lb. per sq. in.	73,600 lb. per sq. in.

On the general subject of cost of welding in a steel foundry, most authorities feel that it is more than offset by the saving in repair work. Typical of answers on this subject is that from Mr. Quinn, who says:

"The standard of the product of some foundries as it comes from the sand is so high that only superficial welding is necessary. Other foundries have an excessive amount of this kind of welding, and also are bothered with cracks and shrinkage of a serious nature. It will be understood that the savings in the two types of foundries will vary greatly.

"When welding was first introduced, less than 25 years ago, the only process then known was the oxy-acetylene type which was expensive and slow. Foundries, therefore, pre-

ferred to ship their castings with minor defects, resorting to welding only for major defects, and to salvage castings that would otherwise be scrapped. All foundries today probably use electric welding, which is fast and cheap, for surface defects, but, in their own interests, strive to make better castings in the foundry.

"Some foundrymen wonder how the welding industry has developed to such an extent when some very particular consumers are prejudiced against repairing serious defects in steel castings. The answer is that consumers will always find a way to justify something cheap, and certain kinds of welded construction are undeniably superior to certain designs of steel castings, especially large open-hearth pieces of plain design. And, too, there might be less prejudice against repairing serious defects in steel castings if the purchaser could be assured that the proper preparations would be made for the weld. This is admittedly an extremely difficult thing to do under some circumstances."

Improvement in Technique

As the technique of welding improves, the use of combinations of rolled and cast parts, and the building up of large castings by joining of several small ones, will undoubtedly increase. In fact, many feel that it already is increasing at a rapid rate. One foundryman says that if the depression brought no other good, it certainly aroused the foundryman to a new conception of his mission and his part in industry of the future. Welding of cast iron has been successfully solved, and, in fact, experimentally at least, practically every type of casting has been successfully welded both to other castings of the same type and to rolled metal parts. It is not always necessary to use the same metal. Highly successful welding on cast iron is being done with bronze.

One authority describes joints in cast iron pipe. Straight sections are butted together and a collar of bronze is then welded on. This joint, he says, has many points of superiority over the old-fashioned bell-and-spigot joint. This same authority, commenting further on the use of bronze for welding, states:

"Where preheating is impossible, or where a high degree of preheat would be undesirable, welding with bronze is often recommended. This process is valuable where it is necessary to weld a part without dismantling machinery. The casting should be prepared for welding in the same way as when welding with a cast iron filler is contemplated, except for the preheating. It may be possible to dispense with this entirely, but if it is necessary to preheat, the casting need only be raised to a temperature high enough to char a newspaper. Excellent results may be obtained with this process, properly applied.

"A Tobin bronze, manganese bronze, or other good quality bronze welding rod is used for this work. The casting is best prepared for welding in the same way as for welding with a cast iron filler rod, except that the parts are beveled through to the bottom of the break. Often when the sections being welded are so thin that they may be heated through to the bottom of the break with the blowpipe, the welding with bronze may be done without beveling the edges of the break. In such a case the operator must be very careful that the edges are sufficiently heated before the filler metal is introduced, and that a free-flowing welding rod is used. A Tobin bronze rod is generally recommended for bronze welds in sections prepared in this way."

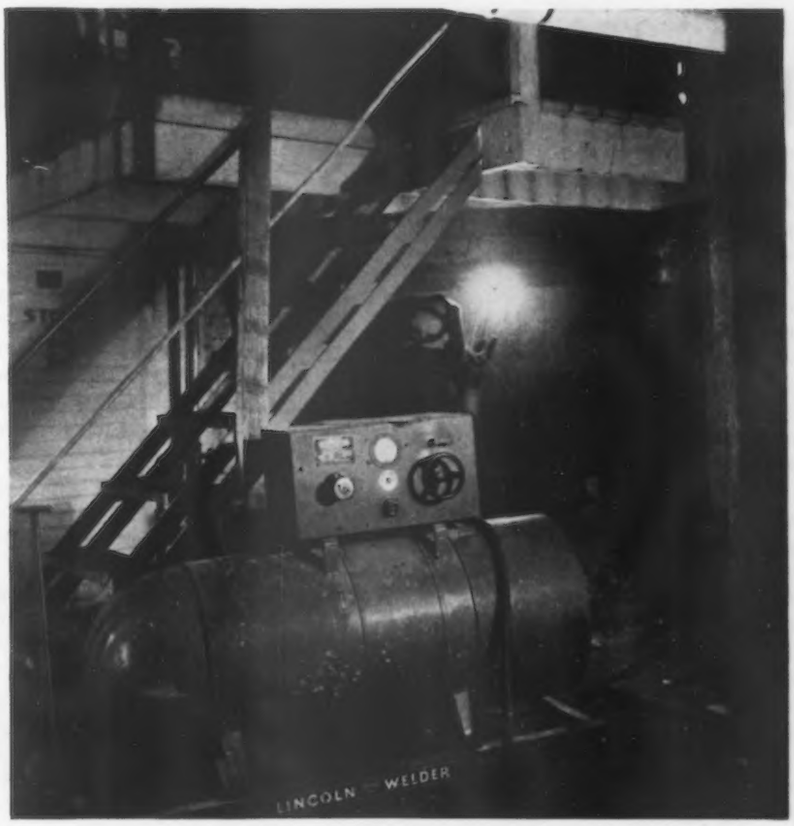
Brew Kettle "Stretched" to Double Capacity

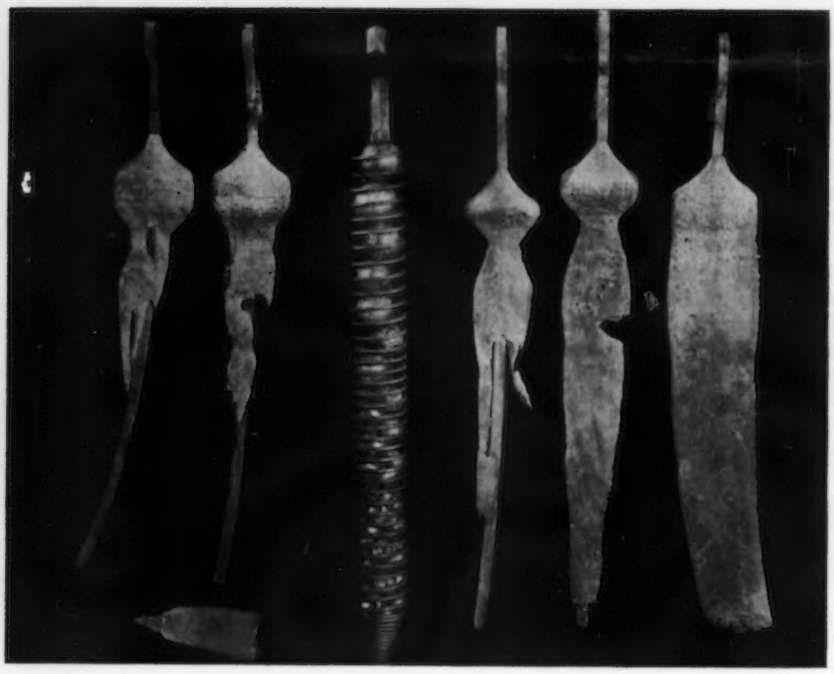
"STRETCHING" a brew kettle so as to more than double its capacity proved a simple operation for the Cream City Boiler Co., Milwaukee. Arc welding provided the answer.

A local brewery had a 50-barrel per day capacity brew kettle which was insufficient for its requirements. An immediate increase of capacity was necessary to fulfill orders.

To accomplish this, the original spherical brew kettle was cut horizontally through the center. With the upper half elevated, four 3/16 in. x 66 in. x 84 in. sheets were inserted and lap welded over the exterior of the original kettle and butt welded to each other. In this manner the capacity of the brew kettle was increased to 107 barrels per day. It is literally a case of "stretching" this brew kettle to more than double its capacity. The work was completed in two days.

The photograph shows the welder making the lap weld of the new sheets to the spherical bottom of the brew kettle. All welding was done by the shielded arc process using Fleetweld electrodes and a welding machine manufactured by the Lincoln Electric Co., Cleveland.





AT LEFT

The ball anode is here compared with the usual slab anode. Various stages of disintegration of the slab anode are shown. As these corrode, the area decreases, thus disturbing the metal content of the bath. Chunks of cadmium metal fall from the straps to the bottom of the tank where they are useless as anode material. On the other hand, the helical coil anode, consisting of pure cadmium balls, corrodes evenly. As the diameter of the balls diminishes, they descend in the wire container, and fresh balls are added at the top.

AT RIGHT

Long still tanks, equipped with special overhead handling devices, are used for cadmium plating airplane frames and parts.

How Attractive Finish Helps Metal

By W. L. CASSELL and A. B. HOEFER

THE use of cadmium as a protective coating for steel and other metals in the metal working industry has shown a steady increase ever since its first practical application in 1919, and the accompanying article gives some of the chief features covering the

BEFORE cadmium plating was practical it was exceedingly difficult to adequately protect piano wire against corrosion without interfering with its sound producing properties. It also was difficult to plate such items as springs and delicate edged tools without embrittling them. A cadmium coating on metal, because of its extreme thinness and the relatively low temperature and short time of the plating process, affects neither tone nor temper, and it was in such fields, therefore, that the merits of cadmium plating were first discovered and utilized.

The art of cadmium plating is relatively young. Marvin J. Udy, a research chemist in the employ of Elwood Haynes, automobile manufacturer, is credited with the first commercial application as late as 1919. From this beginning, the use of cadmium for corrosion prevention has progressed to all parts of the civilized world.

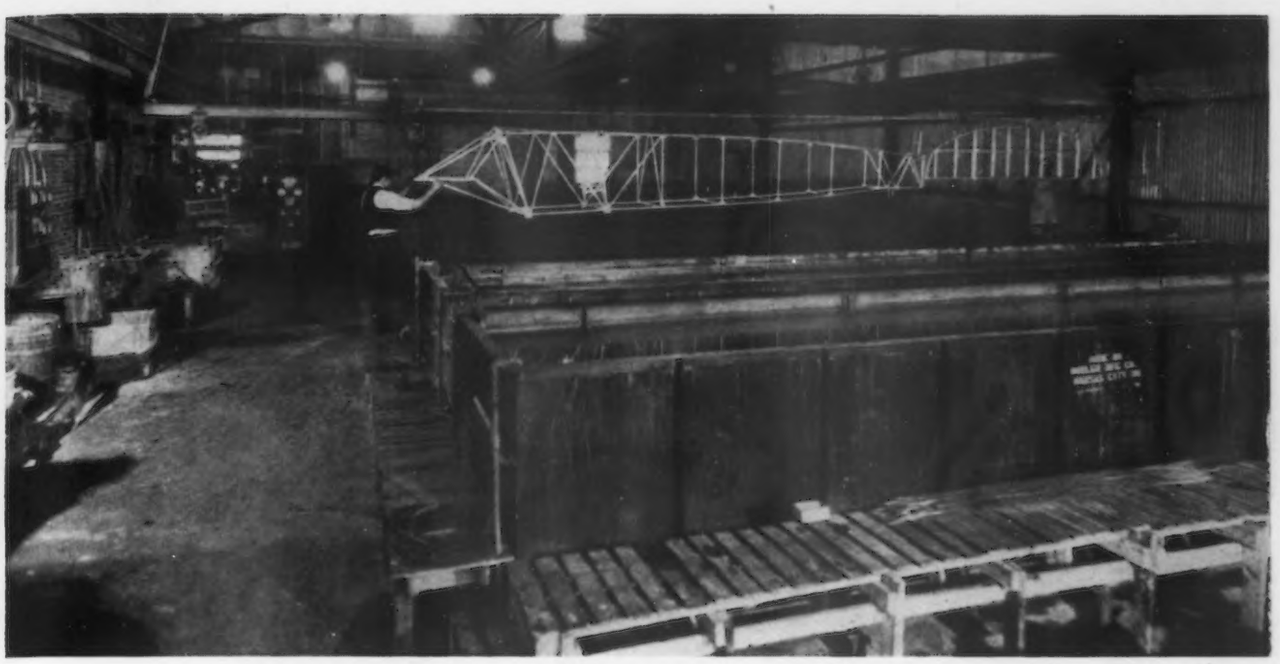
Cadmium applied as a thin plate to most any base metal forms a nonporous, metallic sheathing which completely covers the surface and protects it. This statement is partly true for other coatings such as tin, lead, copper, and nickel. However, these frequently are porous, and if they become damaged through mishandling and a small portion of the base metal is exposed, corrosion begins on the exposed part and spreads until it affects the entire surface.

Cadmium, on the other hand, gives its protection to metal parts by exclusion of the corrosive media from the base metal. It functions in a capacity differing from that of most other plated metals, and this probably accounts for its widespread use as a protective coating.

Cadmium is anodic to iron. This means that protection continues even should the ferrous base metal become exposed. The cadmium must corrode before the iron itself is attacked.

This phenomenon can be easily proved by a simple experiment. Fill two beakers or glasses with a solution of ordinary table salt. Immerse in each beaker a steel washer and allow it to remain for 24 hr. But in one washer insert a plug of solid cadmium in the center hole. Afterward, examine both washers. There will be visible signs of corrosion on the unprotected steel washer, while no corrosion will be visible on the washer with the cadmium plug. The plug only will be etched by the corrosive liquid.

This experiment illustrates what is



Products Sales 21—Cadmium Plating

plating processes, and some of the principal applications.

This series is being prepared under the direction of Herbert R. Simonds for The Iron Age. Mr. Cassell and Mr. Hoefer are associated with the Udylite Process Co., New York.

known as "sacrificial" protection. When cadmium is in contact with the steel, the latter is protected, since the cadmium must corrode away before corrosion of the base metal commences.

Coatings such as nickel, lead, tin, and chromium do not offer this sacrificial protection. While they themselves resist corrosion well, as soon as the base metal is exposed, corrosion begins at that point.

Cadmium coatings, when properly applied, possess an attractive silvery-white lustre. The sheen is not as brilliant as that of chromium, and is described as having a "satin" appearance.

The lustre of the cadmium deposit lasts a long time. However, after exposure for an extended period, the coating takes on a frosty white hue which is not unattractive. Some tarnishing after exposure is a property which cadmium has in common with all electro-plated coatings, with the exception of chromium. Cadmium tarnishes at about the same rate as nickel.

The metal, cadmium, is rather high priced, at present about 55c. a lb., but cadmium plating on the other hand is relatively inexpensive. This is due to several factors. The thickness of the cadmium coating generally applied is thin (a thickness of 0.0002 in. is generally recommended for indoor exposure). One pound of cadmium when applied to a thickness of 0.0002 in. will coat an area of 112 sq. ft. Thus the actual cost of the metal used in coating 1 sq. ft. is .5c. Furthermore, no mechanical operations such as buffing and polishing are necessary. The coating comes from the bath bright. There are other factors influencing cost and these will be pointed out when the method of applying cadmium is discussed.

As might be expected from the foregoing discussion, cadmium has many applications. Each of these applications is due to the particular property or group of properties which fit exactly the finishing requirements of the manufacturer. The combination of efficient rust prevention, pleasing appearance, and low cost, accounts for most of the popularity of cadmium among manufacturers.

While these three advantages in one finish offer an attractive combination, not all manufacturers are in a position to benefit by all three. The manufacturer of tools or lighting fixtures may want a protective, attractive finish, but the casket manufacturer generally wants only economical rust protection. He cares nothing for appearance, since most caskets are coated with heavy decorative lacquer coatings applied over the cadmium coating.

Cadmium has the property of re-

sisting the corrosive action of weak alkalies such as are present in washing soaps and powders. For this reason, practically all prominent manufacturers of washing machines use cadmium as the protective coating for steel wringer parts. In addition, other steel parts of the washer are cadmium plated to prevent corrosion.

to such an extent that it tends to destroy some other protective coatings.

Rust and corrosion of steel members are the causes of many cracks in concrete.

Soldering

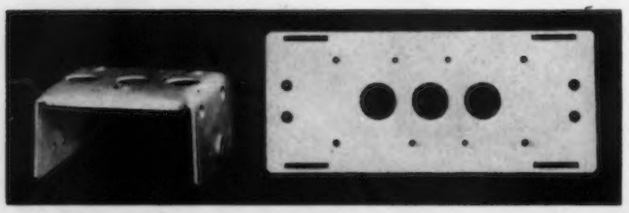
Cadmium plated surfaces are easily and economically soldered, which advantage is a boon to the manufacturer of electrical products. Tests, conducted recently, have proven that soldering may be done as efficiently on cadmium as on tin dipped surfaces, and at a lower total cost.

One of the most important properties of a coating is its ductility. Many products are deformed on repeated use, and the coating must be sufficiently ductile to conform to the new contours and continue to provide protection.

Some manufacturers have found the ductility of cadmium coatings to be advantageous from a manufacturing standpoint. For example, one maker of radio condenser shells cadmium plates the flat blanks and, after plating, the blanks are formed into the desired shapes. By this method of pre-plating, storage space is conserved and a better plating job results, since a flat surface is more easily coated uniformly than is a complex one.

A feature of a good electrical switch is that its parts allow the free passage of electrical current with a minimum of contact resistance. Uncoated copper parts oxidize, and the oxide formed sets up a high contact resistance, causing excessive overheating and still further oxidation.

Cadmium plating of the copper parts which come in contact, reduces the tendency to oxidation, and yet the cadmium coating does not increase the contact resistance.



On a production basis, and after cadmium plating, the flat blank shown at the right is formed into the shape shown at the left. This well illustrates the ductility of the coating.

Small parts are nearly always cadmium plated in plating barrels. This shows a typical line-up. The barrels themselves are made of hard rubber, bakelite, or similar non-conducting material.

One of the most familiar metal parts in modern commercial life is the gasoline hose nozzle at filling stations. This illustrates one of the best applications of cadmium plating.

In the construction of buildings, such parts as I-beams, angles, and terra cotta anchors often are immersed in concrete. In many such instances, a protective coating is desired, since the concrete is porous and permits access of moisture to the steel. Cadmium fits into the scheme nicely because the concrete is also alkaline

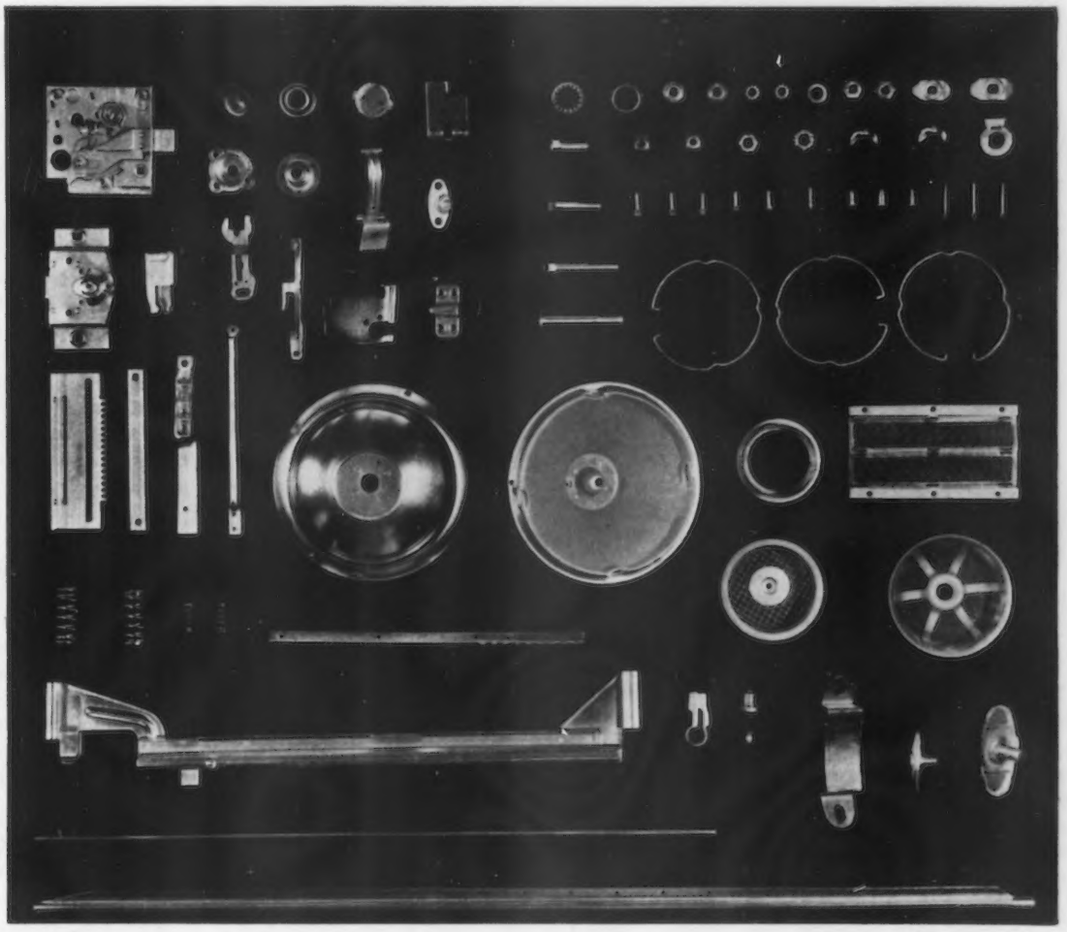
Corrosion of Dissimilar Metals

In most radio sets, there are copper, tin, brass, and steel parts in contact with one another. In the presence of moisture these dissimilar metals set up a battery or "Voltaic pile." This battery generates stray currents which interfere with the function of the radio set and prevent clear reception. To overcome this difficulty

the parts may be coated with cadmium.

When aluminum and steel are in contact, the former tends to corrode quickly, due again to the "Voltaic pile" set up in the presence of moisture. Since the electro-potential of cadmium is so close to that of aluminum, cadmium plating the steel eliminates the corrosion.

When manufacturers demand a more brilliant finish than that obtained with cadmium, they often find it advisable to use cadmium as the under coating, over which a final chromium finish is applied. In such a combination cadmium supplies the resistance to rust.



The automobile industry is one of the largest users of cadmium plating, and the miscellaneous group of parts here shown gives some of the typical examples.

Application of Cadmium

Cadmium is applied to the surfaces of metals by electro-plating in fundamentally the same manner as copper, nickel, and chromium. The chief distinction of cadmium plating from other types of plating lies in the fact that (1) well compounded cadmium baths are very easily controlled, (2) the plating is accomplished at room temperature, (3) no toxic or obnoxious fumes are evolved, thus precluding the necessity of exhaust systems, and (4) the cadmium bath has the ability to deposit metal into deep recesses, in other words, it has a good throwing power.

Since a high percentage of faulty plating of all types is due to poor cleaning, this first step in the plating procedure is of the utmost importance. Cadmium, and other coating metals as well, cannot be properly deposited on other than a chemically clean surface.

Cleaning may be divided into two main parts—removal of oil and grease, and the removal of oxide and scale. Both of these processes have been discussed at considerable length in previous articles in this series.

Following the cleaning, the parts are ready for the actual plating. They are immersed in the plating bath and made the cathode in an electrical circuit. The action continues until the desired thickness of coating is secured. The parts are then rinsed in cold and hot water and dried.

No auxiliary treatment, such as buffing, is required after the parts come from the plating bath. The lustre of the coating is generally sufficiently bright without extra handling and additional expense. When a higher lustre is desired, special chemical dips accomplish the purpose.

Control of the Plating Bath

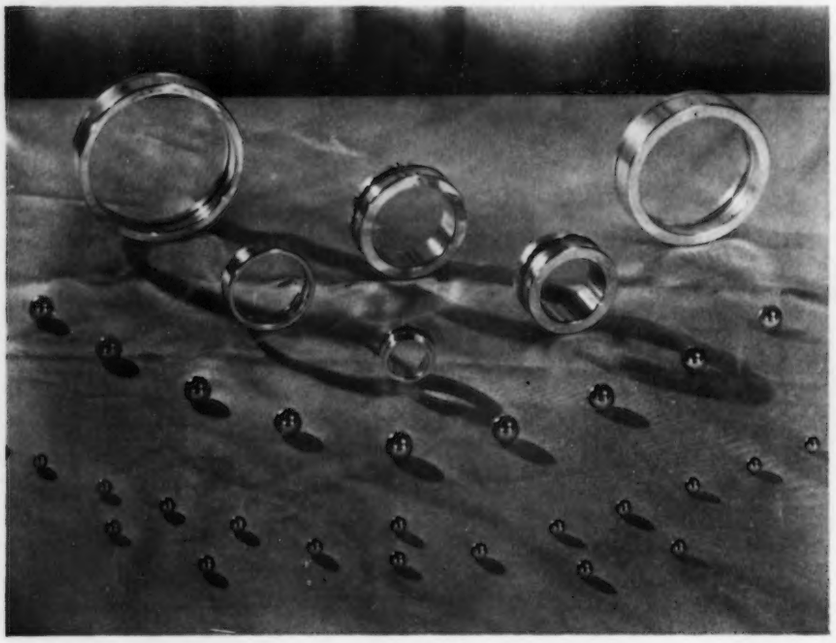
The ease with which a cadmium plating bath continues to produce bright cadmium deposits lies in the simplicity of the ingredients of the bath itself. In the properly compounded cadmium bath, it is necessary to control the quantity of free cyanide and metal. This usually is accomplished by making simple tests about once every two weeks. There is a certain optimum range at which a bath functions best, and this range obviously should be kept as constant as possible. When the lustre of the plates slowly diminishes, a small addition of organic brightener is made.

The Metal Content

The properly formulated cadmium plating bath for general purposes has a metal content of approximately 2½ oz. of metallic cadmium per gallon of plating solution, and it is important that this optimum metal content be maintained. In other words, as metal is plated out of solution on to

the work, this metal must be replaced in the solution in order to maintain proper balance.

The most efficient and economical method of maintaining metal content is to use a soluble cadmium anode. Of course, the metal content of the bath might be built up by additions of cadmium oxide or other cadmium salts, but these contain 15 per cent or more of oxygen by weight and thus some



In order to give a high lustre, these cadmium plated parts were carefully polished before plating, and then buffed afterwards. ▲▲▲

15c. out of every dollar spent for cadmium oxide is wasted.

In order to eliminate cadmium oxide additions and still preserve a perfect metal content balance between "income" and "outgo," the ball anode was developed. A view of this anode is shown in the illustration. It consists of a steel, helical coil, wire container which holds pure cadmium balls about 2½ in. in diameter. As the ball anodes corrode, their diameter lessens, and they descend in the container. As soon as there is room, new balls are fed in at the top. The bottom of the container tapers to a cone where small particles of cadmium balls collect until they are entirely used up.

This type of anode is used by the large majority of manufacturers doing cadmium plating, because no metal is wasted, because anode area stays constant, because it maintains proper metal balance in the solution and eliminates the necessity of cadmium oxide additions.

The free cyanide content for best results should be 6 oz. and 8 oz. per gal. for still tank and barrel plating solutions respectively. The function of this ingredient is to carry current through the bath and thus effect the transfer of metal from anodes to work. The strength is regulated by additions of sodium cyanide.

Thickness and Lustre

Mention has been made earlier about amount of metal deposited, or thickness of deposit. This is undoubtedly one of the most important items to be included in this discussion.

A coating less than 0.0001 in. thick will have a number of microscopic pinholes through which the base metal is exposed. Corrosion is moderately rapid in such cases. At a thickness of 0.0002 in. these pores are covered, with the result that a continuous film envelops the base metal. A 0.0002-in. plate is an efficient rust preventive where the degree of exposure is not severe, such as indoors.

When a 0.0004-in. plate is deposited, the entire surface is covered with a continuous thick film and is amply protected against severe corrosion. In general, a 0.0002-in. coating is several times as rust resistant as a coating of 0.0001 in., and a coating of 0.0004-in. more than doubles the efficiency of the 0.0002-in. coating.

Specifications for thickness of cadmium, therefore, should be 0.0002 in. for articles subject only to indoor corrosion, and a minimum of 0.0004 in. for articles exposed to outdoor conditions. Where parts are plated to prevent rust while in stock or for a short period of time, a thickness of 0.0001 in. may be permitted.

Brightness, while important from the standpoint of appearance, also has a direct bearing on rust resistance of the plate. Tests have shown that a plate which comes from the plating bath bright, lasts longer than a dull plate of the same thickness, due to the fact that a bright deposit is close grained. A dull plate is made up of larger crystals and is more porous. Because it retains moisture and corrosive elements to a greater extent, it is corroded more quickly.

Specifications as to lustre are rather difficult to draw up, since base metals differ so widely. About the only way of dealing with brightness is the simple requirement that the plate be lustrous and free from gray or burnt areas.

Uniformity of thickness is the major consideration when the efficiency of rust protective coatings are concerned. If a coating is 0.0002 in. thick at one point and 0.0001 in. at another, as a rule the thinner portion will fail much more quickly than the thick one. It is of paramount importance, therefore, that protective coatings be uniformly deposited on the surface of the article.

Some plating solutions have a greater tendency to deposit uniform coatings than others. Uniformity of coating thickness has a direct and intimate connection with that electroplating phenomenon known as "throwing power," this being the ability of an electro-plating solution to deposit metal upon recessed surfaces.

Throwing Power

When a plating bath has this ability, it is said to have good throwing power. Should it lack it, the throwing power is said to be poor.

Throwing power will vary from one metal to another, depending on the native properties of the metal and on the type of plating solution used. Generally speaking, alkaline and cyanide baths have considerably greater throwing power than acid baths. The following commercial plating solutions are listed in order of their degree of throwing power:

1. Alkaline tin
2. Cyanide cadmium
3. Cyanide copper
4. Cyanide zinc
5. Nickel
6. Acid copper
7. Acid zinc
8. Acid chromium

The throwing power of a bath is of importance because it exerts a direct influence on the cost of the plating. For example, a cadmium plating bath, with good throwing power, will plate a recessed part to a thickness of

0.0002 in. in, let us say, 10 min. In order to plate the same recess with the same thickness of metal in a bath having poor throwing power, it would take approximately double the time, or 20 min. Thus, the amount of equipment necessary to plate a day's production would necessarily be double that required for cadmium plating. Other items also enter in, such as high power consumption and loss of metal being built up on protruding parts of the article.

Equipment for Plating

The commercial application of cadmium plating at present is principally in the field of relatively small products such as bolts, nuts, rivets, washers. The cadmium coating on such items is normally applied in a revolving barrel, of which there are several excellent designs on the market. The typical barrel consists of a perforated cylinder made of bakelite, hard rubber, or a similar non-conducting material, and arranged so as to be lowered into a tank containing the plating solution. Along two opposite sides of the tank, ball anodes are placed.

In operation the cylinder revolves after being submerged, and the electric circuit is completed through the work to cathodes held stationary within the cylinder. These cathodes take various forms. One design uses spider cathodes at each end of the cylinder, and another design uses straight bars against which the work contacts as the cylinder revolves.

Products usually cadmium plated in such equipment include spark plug fastenings, hose connections, radio parts (including condenser blades), brake shoe parts, and heddles used in textile plants. Larger parts such as those used in aircraft, in washing machines, and in marine work, are handled in large tanks much after the fashion used for nickel plating. In fact the entire equipment for cadmium plating is similar to that used for nickel plating, but since cadmium plating is quicker and at room temperature, its equipment is much less extensive. For instance, a cadmium plate of 0.0002 in. under normal conditions will be applied in 10 min., but a nickel plate of exactly the same thickness, by the usual method of plating, will take 45 min., and for a given tonnage will require four times the equipment. Recently a high-speed nickel plating process has been developed for use primarily in the automobile industry, and the above comparison does not take into account this newer method.

One of the objections to cadmium has been that paints, colored lacquers and enamels often do not adhere very well. Quite recently this difficulty has been overcome by the development of special coating materials. They adhere well and will stand severe bending and deformation without cracking or peeling. Another recent development is special pre-treatments which make ordinary paints adhere quite satisfactorily.

In some fields, cadmium plating has not yet found practical application. One of these is the protection of steel wire. Galvanizing, which is now the usual method of protecting guy wires, telephone wires, and bridge cables, has the disadvantage, in comparison with cadmium coating, of being heavier. Some engineers have figured that if it were practical to cadmium plate the wires which make up the large cables of suspension bridges, the resultant saving in weight of cables alone would be a surprising item. In the case of the George Washington Bridge, one engineer has estimated that the weight difference of the coating would make it possible to carry an extra lane of traffic.

Cadmium, as usually plated, is very soft. In fact some authorities say that tin is the only metal in commercial use which, when plated, is softer than cadmium. Recent progress in copper plating has been in the direction of control of hardness of the plate, but even at its softest the copper coating is harder than cadmium.

This, of course, is not necessarily an advantage for cadmium, although a definite advantage of the cadmium plate is its ability to spread and cover exposed areas. It is possible, for instance, to so design dies that stampings out of cadmium plated sheet steel will have the edges protected. This protection is secured by a squeezing or rolling action just at the end of the stroke, which action spreads or turns the coating so that it covers the cut edge.

One disadvantage of the softness of cadmium is that it is apt to be removed in the buffing and polishing process if the usual speeds and pressures are employed. One extensive user of cadmium recommends getting green men to do the buffing and teaching them to use a very light pressure. He says that he has found it almost impossible to take a man familiar with buffing a hard surface such as stainless steel and put him on to cadmium plate buffing. Invariably he will polish off the coating and expose the base metal.

"Flexible Tooth" Gears Operate Quietly

Patented "flexible tooth" gears employed in products of the Roots-Connersville Blower Corpn., Connersville, Ind., are shown in the accompanying illustration. They have epicycloidal addenda with radial flanks, are generated on special Gleason gear planers, and are designed to have at least three teeth in working contact at all times. Individual teeth are said actually to flex a fraction of a thousandth of an inch when they come into initial contact with a mating tooth, permitting the pressure to be distributed among the three pairs of teeth which are theoretically under load. This, it is stated, reduces the individual tooth load, resulting in maintenance of a better oil film and practically eliminating shock and acceleration forces, giving extremely quiet operation even at speeds formerly considered impracticable with spur gears in this service.

The gears illustrated are 36 in. in pitch diameter, 16 in. in face width, and are designed to transmit 1000 brake h.p. at 360 r.p.m., or a pitch line velocity of about 3400 ft. per min. They weigh 5100 lb. Gears of the same type are working at pitch line velocities of 6000 ft. per min.

It is stated that the metal used must have the property of easy machinability and resist fatigue and wear. With a mixture of cast iron, 40 per cent steel, 1 per cent chrome and 2 per cent nickel, giving a tensile strength of 42,100 lb. per sq. in., gears similar to those illustrated are said to have shown practically no wear, the tooth surface having been burnished to a high degree of hardness.

Dodge Uses Electric Trucks to

Steel sheets being unloaded by crane onto trailer which is hauled by a heavy-duty electric tractor.

Parts are handled in standard skid boxes which are picked up and transported by low platform, low lift electric trucks from one part of the plant to another.

ECONOMICAL handling of materials is an essential part of an efficient manufacturing system. Particularly is this true in an automobile plant, where hundreds of small and large parts must be transported, quickly and at minimum expense, from one operation to another and from department to department.

Obviously, to secure the best method of moving materials, all available types of equipment must be studied and the type chosen which seems best adapted for each job. This selection is dependent on a number of factors, not the least of which is the kind of building in which production is carried on.

With this factor strictly in mind, Dodge Brothers Corpn., Detroit, division of Chrysler Corpn., has in operation 104 electric trucks which each working day handle an average of 750 tons of steel, 550 tons of castings and 2000 units of miscellaneous parts and materials.

These trucks operate principally in three divisions of the Dodge plant—the foundry, the pressed steel department and what is termed "the Dodge main plant." In the foundry the electric trucks perform a multitude of duties, such as carrying sand to the molds and hoppers, cores to the assembly line and rough castings from the foundry to the various machining departments.

In the pressed steel department stampings are handled between operations in skid boxes picked up by electric trucks, except in cases where one operation adjoins the succeeding one so that a gravity chute can be used advantageously. Throughout the Dodge main plant castings and forgings are transported in skid boxes hauled by electric trucks. In each division trucks are under the supervision of a foreman who cooperates with the division superintendent in distributing them so as to expedite the handling of parts and materials.

It is noteworthy that trucking activities in each department are self-contained. That is, trucks assigned to a specified department do not move out of that department except to de-

Handle Materials Economically

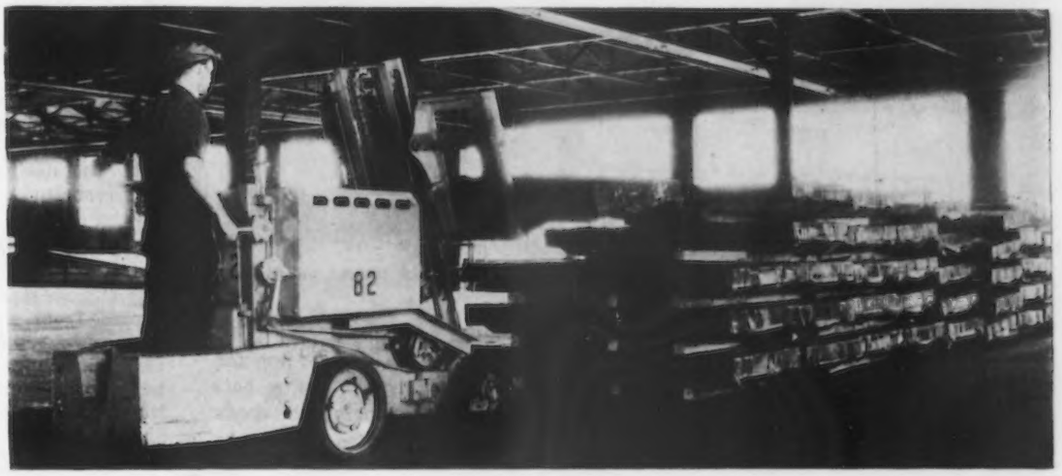
liver castings to other departments for further processing.

Low-platform, low-lift trucks are the most commonly used type of electric carrier at work in the Dodge factories. They are employed mainly for carrying skid boxes with a total capacity of 6000 lb. The load platform is elevated by two large eccentrics which are driven by a triple reduction spur-geared power unit. An automatic cut-off switch limits the platform travel in either direction.

The truck operator is able to steer this type of truck around corners and maneuver it in congested quarters because of the horizontal movement of the steering handle and the liberal use of ball and roller bearings throughout the steering gear connections. The ease of driving the truck and its speed make possible relatively swift transportation of materials.

DODGE BROTHERS CORPN. has in operation in its Detroit plants 104 electric trucks which each working day handle an average of 750 tons of steel, 550 tons of castings and 2000 units of miscellaneous parts and materials. This article describes the various kinds of electric trucks used by Dodge Brothers and how they fit into the corporation's scheme for efficient production.

High-lift trucks also are used extensively in the Dodge plant. These elevating platform trucks are built to a standard overall height of 83 in., permitting them to enter a standard



To pick up bulky loads, especially steel sheets, and carry them in a safe position for warehouse stacking, Dodge uses electric trucks of the high-lift, tilting-frame type.

A part of Dodge's fleet of electric trucks. The large truck in the foreground is used to charge the foundry cupolas.

box car door from a loading platform level and deposit loads within the car. Whenever desirable, the load can be elevated to a height of 62 in. Here, as in the low-lift truck, a triple reduction spur-gear power unit is employed to raise the platform by means of sprockets and two standard roller chains.

In case the truck platform should meet any obstruction in its downward movement, the hoisting mechanism is protected from damage by a protective ratchet or free wheeling device which is built into the final drive gear and which will automatically slip and prevent breakage.

To pick up bulky loads, especially steel sheets, and carry them in a safe position for warehouse stacking, Dodge uses electric trucks of the high-lift, tilting-frame type. The short overall length of this truck, only 89½ in., enables the vehicle to move through narrow aisles and congested areas. Individual and interchangeable triple reduction spur-geared power units are used for both hoisting and tilting.

One unit tilts the upright frame either 4½ deg. forward or 25 deg. backward through two heavy-duty racks and driving pinions. The other unit elevates the vertical traveling carriage to a maximum height of 83 in. by means of sprockets and two standard roller chains. Dual tilting and hoisting control handles are arranged on both sides of the operator's platform so that both movements are possible from either side of the truck, allowing the operator to accomplish speedily and conveniently all jobs with safety.

Large sizes of sheet steel are handled by a combination of overhead traveling crane and heavy-duty, twin front wheel electric tractors pulling a trailer. Bundles of steel are moved by crane from stock piles on to the trailer and thence transported wherever desired. The twin front wheels of the tractor are supported on a leaf type automotive spring. Heavy coil springs support the chassis over the driving axle. This spring suspension makes riding easier and cushions the chassis and battery.

Electric tractors also are used to pull various kinds of trailers, some of which move scrap material from one part of the plant to another.

Electric trucks and tractors of all kinds are housed overnight in a garage where batteries can be plugged in conveniently to an electric line for recharging, if necessary. If a battery should go dead during the day's operation, a new battery can be slipped in with slight difficulty.

Scrap materials are moved from one part of the plant to another in trailers pulled by electric tractors.

The materials transportation system at the Dodge plant has as one of its key points the use of corrugated steel skid boxes 60 in. long and 42 in. wide. Made of No. 7 gage steel, these boxes are 24 in. deep, the bottom of the box being the top of a standard corrugated steel platform. The boxes are of two-piece welded construction and are welded to the platform, which stands 24 in. above the ground.

Dodge Brothers Corpn. has found that electric trucks are particularly adapted to its requirements because of their flexibility in service. Other types of handling equipment have proved satisfactory where volume is large and the main purpose is to move parts and materials from one exact spot to another exact spot, with reasonable assurance that this set-up is relatively permanent.

LETTERS TO THE EDITOR

Welding's Challenge To Steel

Editor, The Iron Age:

Your issue of May 24 reprinted a paper entitled, "Welding's Challenge to Steel," by Everett Chapman, vice-president, Lukenweld, Inc., before the American Iron and Steel Institute. Since the author is a prominent welding expert and his audience was made up largely of manufacturers of rolled steel, it is not surprising that he should emphasize the merits of a process that holds commercial advantages for both industries. However, since no mention is made of other branches of the steel industry, notably the steel castings division, the title of his address undoubtedly was too broad.

While admitting the brilliant progress of the welding industry and appreciating its ingenious publicizing, makers of steel castings properly feel that in some quarters the case for their product is being somewhat obscured. I take this opportunity, therefore, to present a few facts for consideration by engineers concerned with the design of machinery parts and structures.

The welding process is a logical development and has a host of suitable applications in our rapidly progressing engineering civilization. It has grown from a means of making a temporary repair to an accepted tool of engineering construction. Admittedly it is handy, and offers possibilities in the direction of light-weight, simplified and, often, rapid construction.

Is it realized, however, that even now the repair of a major defect in a steel casting of any important type is not permitted by most engineers, the more intimate knowledge made available through effective publicizing of welding notwithstanding? Why should this be, if, as has been stated, the technique of welding has been so mastered that perfect soundness is assured and the weld metal, as Mr. Chapman points out, shows characteristics superior to open-hearth steel of the same composition? If such is the case, it would seem logical that the defective casting should be improved by its localized strengthening as the result of welding. Still, the engineer persists in rejecting such castings.

The answer lies, I believe, in the fact that, as in most industrial operations, the human element enters into the making of this type of weld. Short of X-raying, facilities for which are not always conveniently available, the engineer has no guarantee that

(Concluded on Page 73)

Heavy-Duty Welding Unit Joins Lengths Of Strip Steel and Removes Flash

STRIP steel as it comes from the mill rolls is joined into continuous lengths by the resistance welding and flash stripping machine here pictured, which has been built by the Federal Machine & Welder Co., Warren, Ohio. Capacity is for steel up to 0.212-in. thick and from 3⅜ to 8-in. wide.

As the name implies, the equipment combines two machines, a welding unit, and a stripping unit for removing the flash that results from the welding. Both are mounted on a heavy cast-iron bed supported at each side by a welded structural steel base, the stripping unit and its motor drive being at the left hand, the welding unit at the center, and the upsetting mechanism and its motor drive at the right.

Welds are made in 5 sec. after the work has been clamped in position, and the flash is machined off in 5 sec. Clamping consumes but 10 sec., so that the entire cycle of operations is completed in 20 sec.

The upsetting mechanism is driven by a 3-hp. motor through a Reeves variable-speed drive, gear reduction unit, camshaft and cam. The cam is designed to give the correct welding and upsetting speed, and the one cam takes care of any width of material that the machine will weld.

In operating the welder, the attendant first clamps the work in position by turning a valve that actuates an air-operated clamping device, and then presses a button to start the flashing and upsetting mechanism. Upon completion of the weld, the work is released by means of a foot-operated valve. The air-operated clamps are self-adjusting as to variations in width and thickness of the strip steel to be welded.

The platens of the flash welder are of gun metal and are piped for water cooling. The upper welding dies are made of steel and are corrugated to provide a firm grip. The lower dies are of a special copper alloy and are surfaced with Elkonite to assure long, hard service under difficult conditions, such as the welding of material covered with heavy black scale.

The transformer is of the company's flash-proof type, with a continuous rating of 100 kva. It has a power factor of 65 to 80 per cent and an overload capacity of 100 per cent. Primary coils are of inter-leave type. A separate 100 kva. auto transformer provides voltage regulation of 60 per cent in eight equal steps. Regular equipment includes a remote control magnetically-operated switch actuated by a shunt control, which is operated, in turn, from the shaft that transmits power to the flashing and push-up mechanism.

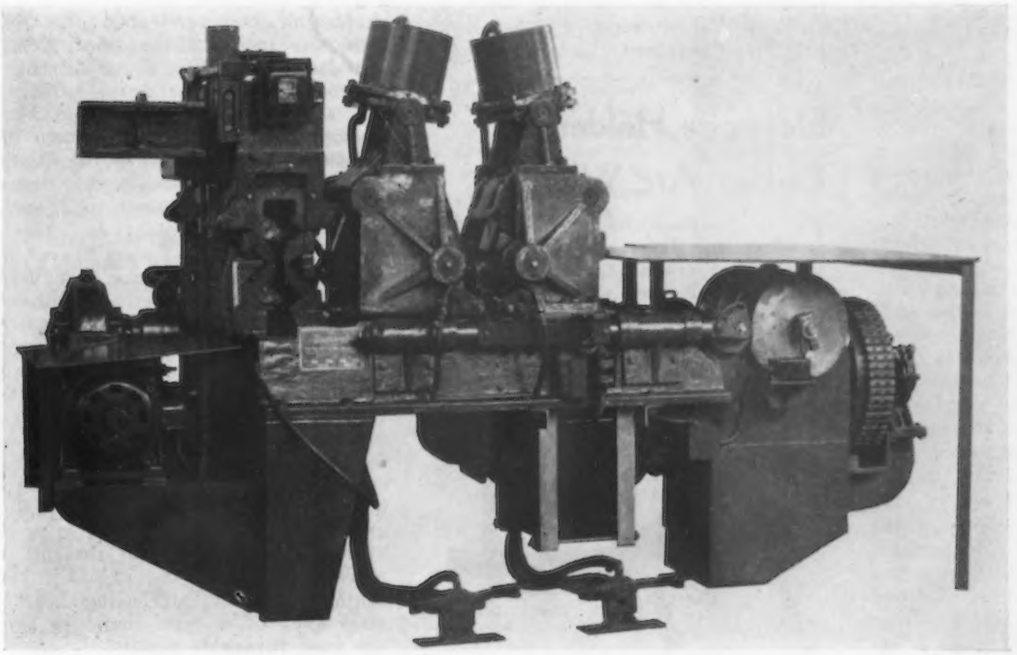
Welding Flash Removed Quickly

The flash stripper, which removes the excess metal after welding, consists of two rams the ends of which carry two tool-holders, one above and one below the work. Each tool-holder is equipped with three high-speed steel tools. One tool is set to the proper height for roughing and the others, arranged to follow the first, are set to make the finishing cut which removes the flash to the actual surface of the welded steel. The rams are driven by a 2-hp. motor through a gear reduction unit and steel rack and pinion. Cutters may be changed quickly, and a holding device is supplied to facilitate proper grinding.

Stripper Ram Returns to Initial Position After Flash is Removed

In operating the flash stripper, the attendant operates a handwheel to grip the welded strip steel to a traveling carrier, and to move it under holding clamps that are part of the flash stripper unit. Next he opens a hand-operated air valve to bring down the clamps that hold the work during the stripping operation. This done, he presses a button to start the motor that drives the ram and cutters forward. After the cutters have passed over the work, the ram stops and the upper clamping arm moves upward, releasing the work. The ram then moves to its initial position ready for stripping of another welded joint.

Bearings throughout the machine are amply protected from flash and dirt, and are arranged with replaceable bushings. All working pins are of tool steel and are ground to fit. The welder and flash stripper here pictured, designated as the No. 70, is 9 ft. 10 in. long; 5 ft. 4 in. wide; and 6 ft. high and weighs 10,000 lb.



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The strip steel passes over the table at the right, through the flash welder at the middle of the bed and then out through the stripping unit mounted on the left-hand end. Welding and stripping are accomplished in 5 sec. each, and the moving and clamping of the work in 10 sec. Stripping is done by high-speed steel tools mounted in a ram that reciprocates across the welded joint, three tools above and three below the work. The machine is designed for continuous production in the joining of strip steel of 0.212 in. maximum thickness, 3⅜ to 8 in. wide.

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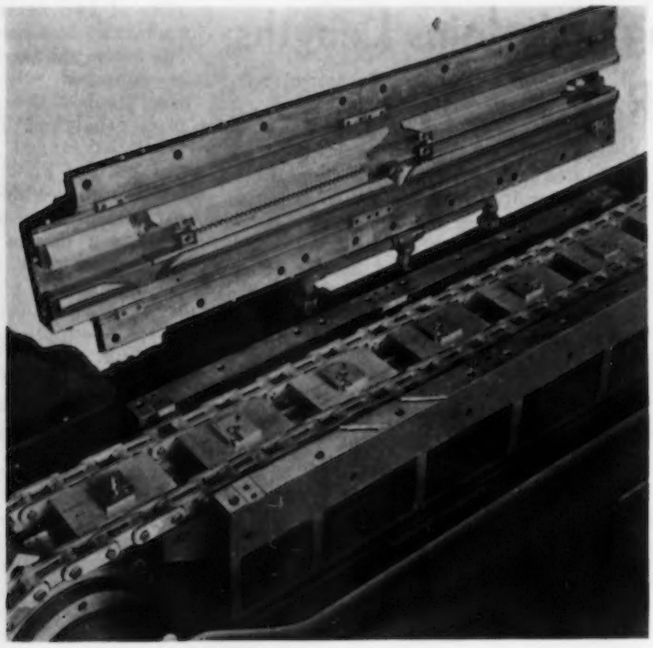


Indexing Fixtures Employed In Surface Broaching

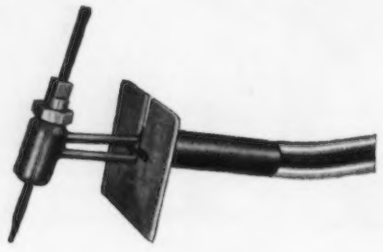
APPLICATION of indexing fixtures to its continuous surface broaching machines has been announced by the Foote-Burt Co., Cleveland. The arrangement is pictured in the accompanying illustration, which shows in addition to the work-holding indexing fixtures, the broach holders removed and the broaches assembled for squaring both ends of the spring shackle pin which is at the bottom of the second illustration.

The pins first pass through the first set of broaches machining two flats on each end. The additional set of broaches can be seen located beneath the fixtures. After this cut, the groove on the top plate of the fixture engages the indexing pin to give the work-holding spindle a quarter turn. The work then passes through the remaining straddle broaches, completing the squares; and the pin is automatically ejected from the fixture. The cam block, which is the second piece in the second illustration, is handled much in the same manner, the part going through the machine but once, two broaches being used. With pieces such as the gear and castellated nut, the part would make more than one pass through the machine and would be unloaded automatically at the completion of the cuts.

Construction and operation of the machine itself, which is built in three sizes, were described in THE IRON AGE of Dec. 7, 1933. The several fixtures are mounted on an endless chain which carry the work through a fixture tunnel where it passes under the broach and is machined complete in one operation. The attendant merely drops the work in the fixtures as they pass the loading station; clamping, machining and unloading of the work are automatic. The machine employs unusually long broaches with many teeth, which makes possible almost any desired quality of finish. Each tooth has a predetermined amount of rise. The first teeth, or roughers, remove the major portion of the metal, and those that follow do the finishing. As no individual tooth is burdened with excessive cuts, long tool life is obtained.

Electrode Holder for Carbon Arc Welding

IN the carbon holder illustrated, water circulates both through the handle and around the electrode. It is stated that even when the carbon electrode is used at a white heat for several hours, the holder itself will remain so cool that it can be touched with the bare hand at any point.



An outstanding advantage claimed for this holder, which has been placed on the market by the Hobart Brothers Co., Troy, Ohio, is that it is designed for use with interchangeable tips, thus making possible the use of the one holder for a wide range of carbon sizes.

The holder is of balanced design, has a comfortable grip and has a 5½-in. square asbestos board hand shield that can be removed and replaced easily with a larger shield if desired. It is only 14 in. long and weighs 2¼ lb. It is stated that the new holder was developed in connection with the company's new "Long Arc" method of welding copper, but is suitable for many other carbon arc welding applications.

Non-Sparking Beryllium Copper Tools

NON-SPARKING, non-magnetic tools made of wrought beryllium copper are being offered by the Stanley Tool & Level Plant, New Britain, Conn., for lacquering plants, oil companies, public utilities and other industries confronted with explosion and fire hazards in production and maintenance. Scrapers, wedges, sledges, drift pins, screw drivers, pry bars, hammers and picks are among the tools of non-sparking type offered by the company.

Tests show, it is stated, that these tools are almost as durable as steel tools of similar design and size. A beryllium copper cold chisel, for example, is said to have cut off the heads of ¼-in. steel rivets, and to have sheared off a section of ⅛-in. thick cold rolled steel, 3 in. long, with no damage to the edge of chisel. Using the corner of the chisel edge a groove 1 in. long was scored in the surface of a piece of wrought iron pipe, the point of the chisel being rounded over. Using the chisel edge, the tool was driven endwise, splitting the 0.140-in. thick wall of 1-in. wrought iron pipe for a distance of 1½ in. with no damage to the chisel.

The Great Western Railroad, Great Britain, proposes to experiment with the use of steel "keys" in place of the wood blocks now used between the side of the rails and the U-shaped jaw of the chairs in which the rails rest to keep them to gage. For some time past the Great Western has been experimenting with various designs of steel keys with a view to producing a type which can be obtained not only at a reasonable cost in comparison with wooden keys, but which will also have as long a life and a greater holding power so as to overcome the tendency of the rail to move forward in the chairs. The company is now purchasing 100,000 steel keys of a type found to give the most favorable results.

FIG. 1 — Welding period may be varied from 1 to 12 cycles in steps of ½ cycle.

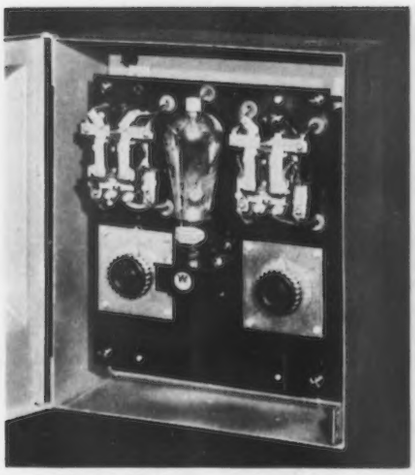


FIG. 2—This smaller electronic spot welder control provides accurate timing for periods ranging from 1/10 to 45 sec.

FIG. 3—(At right) Timer designed for seam welder applications.

Electronically-Controlled Spot Welding Timers

THE three electronic tube-controlled timing devices here illustrated were developed by the Westinghouse Electric & Mfg. Co., East Pittsburgh, for use in connection with the spot welding of dissimilar metals, metals of high thermal conductivity, special alloys, stainless steels, aluminum and all other light gage materials—the spot welding of which requires short and accurately controlled timing of each weld. Electronic tube control permits localizing of the welding heat to the immediate weld vicinity and precision timing, thus assuring closely uniform welds.

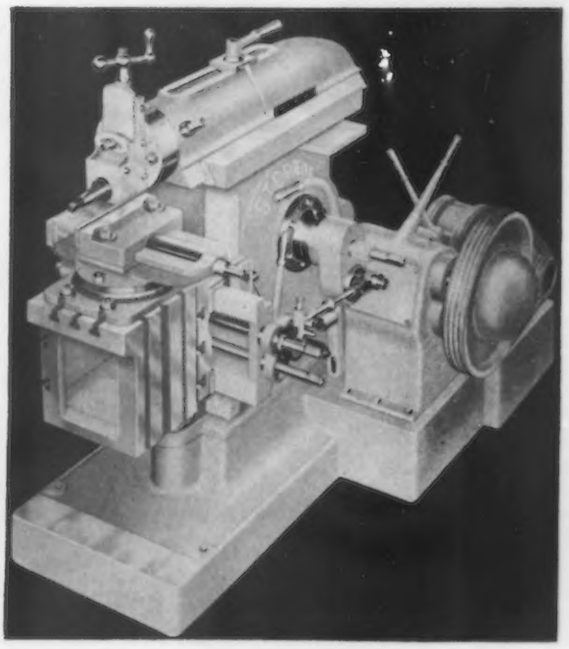
With the control shown in Fig. 1, the Ignitron welding timer for use with spot welders, the welding period may be varied from one cycle (1/60 sec.) to 12 cycles in increments of one-half cycle. For accurate timing of welds of longer period, the small electronic contactor device shown in Fig. 2 is available. This device provides accurate timing for periods ranging from 1/10 sec. to 45 sec. For seam welding (overlapping spot welds) the timer shown in Fig. 3 has been developed.

Shapers With High Ram Speeds

HIGH ram speed, up to 130 strokes a minute, is an outstanding feature of new model Steptoe shapers announced by the Western Machine Tool Works, Holland, Mich. Sizes range from 14-in. single gear to 24-in. back gear, the illustration showing the 16-in. back-geared machine arranged for Texrope motor drive through the speed box.

All machines are now built with V-type ram and have a large size head, which may be swiveled through 120 deg. Bronze and felt retainers serve to keep the ways of the machine clean and oiled at all times. A new finger-tip-control feed mechanism is provided, and all operating controls have been centralized. Timken roller bearings are incorporated in all machines. The speed box is arranged with a twin disk clutch to provide smooth and positive engagement and release. A one-piece solid rocker arm block is employed. Forced feed continuous lubricating system, including pump, Pur-O-Lator and pressure gage can be applied.

STEPTOE shapers are now built with a V-type ram and have large size heads. Speeds up to 130 strokes per min. are obtainable.



Internal Grinder Adapted for Airplane Cylinders and Similar Work

AN airplane cylinder grinding machine, the style No. 73, arranged with a hollow type workhead for grinding single airplane cylinders, long sleeves and pieces of similar nature, has been announced in the Heald Machine Co., Worcester, Mass.

As an airplane cylinder is bolted to the engine by the flange and centralized by the turned diameter of the skirt, the fixture was designed to locate from these surfaces and thus assure the bore being ground at a true right angle with the flange and concentric with the O.D. of the skirt.

In chucking the cylinder, an adapter ring is first bolted to the flange, and then a bracket with a stud is fastened to the rear. The cylinder is next loaded into the workhead from the left-hand end and is centralized by six locating pins. Bars guide it into position. The adapter ring is then clamped against three positive stops by hook bolts operated from the front; these lock the cylinder into the workhead so that the bore is concentric with the center-line of the workhead and square with the flange. A strap with a self-alining end support is slipped over the stud on the bracket at the rear and clamped to the workhead spindle. This serves simply as a support against wheel pressure. With the two adapter rings and brackets regularly furnished the operator is able to prepare a cylinder while another is being ground.

In general design, this new machine is similar to other Heald internal grinders, but it has a much heavier base and wider table ways, which are pressure lubricated. All switches and other electrical connections are contained in one terminal box on the front of the base. An "inching" switch permits the wheel spindle to be jogged around in setting up the machine.

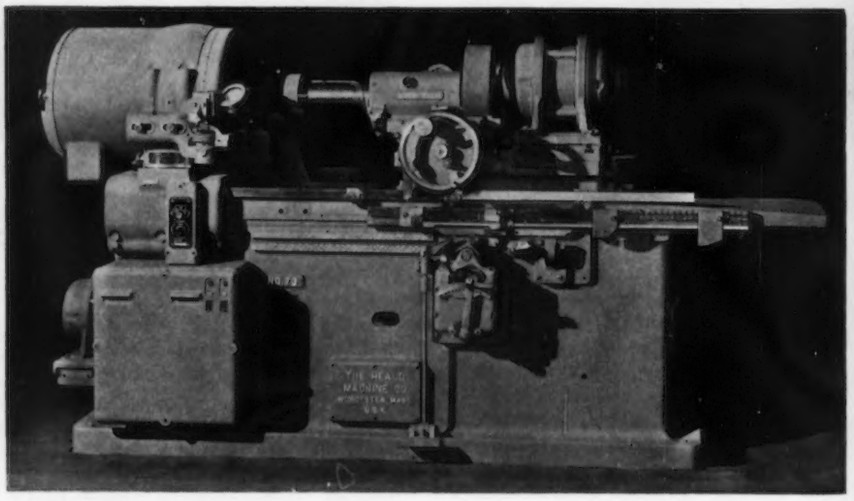
The table, an exceptionally heavy unit, is actuated by the usual Heald hydraulic drive which gives a wide variety of speeds and smooth table movement. The workhead hollow spindle is mounted on two special precision ball bearings, and is designed to permit generous lubrication and to keep out water, dust and other foreign substances. The hole in the spindle is 10 in. in diameter.

The workhead is driven by multiple-V belts from an individual motor. The drive is through a double pulley mounted on an adjustable jackshaft, making it possible to keep tight both the belts to the workhead and from the motor. This type of driving connection is said to eliminate all the vibration that might be produced from flexible idlers. The baseplate of the workhead drive motor is carried on vibration dampeners.

A solenoid brake prevents excessive overrun.

A larger and heavier cross-slide has been provided. A 10-h.p. motor is mounted on the cross-slide base separate from the cross-slide, an arrangement that prevents transmission of vibration to the wheel spindle. To maintain the proper belt tension the motor and cross-slide move together when feeding the wheel into the work. Drive to the wheel spindle from the motor is by belts through a jackshaft that is adjustable for belt stretch. The wheelheads are of Heald "Red Head" design.

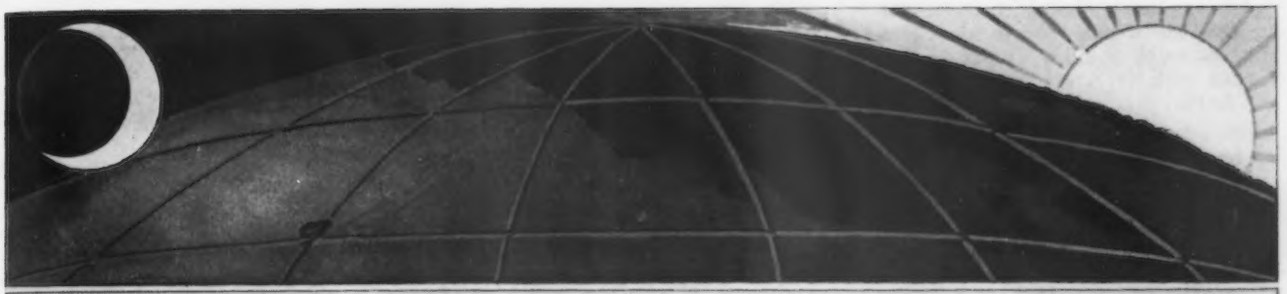
Main drive motor and oil pump are mounted on a baseplate that is carried on vibration dampeners. A 110-gal. coolant tank is located at the rear of the base. Specifications include: Total floor space, 126¼ x 76½ in.; center of workhead spindle from the floor, 50 in.; workhead speed, 100 to 200 r.p.m.; table speeds, 0 to 44 ft. per min., and net weight, 10,000 lb.



Single airplane cylinders, long sleeves and similar pieces may be finished on this internal grinder with hollow - type workhead. The hole in the spindle is 10 in.

In chucking the cylinder, an adapter ring is first bolted to the flange and a bracket fastened to the rear. The cylinder is then loaded into the workhead and is centralized by six locating pins. Bars guide it into position. The operator prepares one cylinder while another is being ground.

The division of simplified practice of the Bureau of Standards has announced that Simplified Practice Recommendation R118-30, on abrasive grain sizes, has been reaffirmed by the standing committee of the industry, without change. This recommendation, which was proposed and developed by the industry in 1930, establishes a table of allowable limits for the sizing of aluminum oxide and silicon carbide abrasives for polishing uses, and for grinding wheel manufacture.



THE NEWS OF THE WEEK

Direct Loans From Federal Reserve Banks

GOVERNOR EUGENE R. BLACK, of the Federal Reserve Board, has issued to the Federal Reserve Districts regulations covering the Federal Reserve Act as amended by the Act of June 19, 1934. The amendment was for the purpose of facilitating loans to industry, through financing institutions and also directly when necessary.

The first part of the new regulations deals with loans secured through financing institutions, which is considered the "normal" or preferred procedure. In other words, direct loans will not be made until the borrower has found it impossible to secure accommodations through his customary channels.

Where such negotiations are made, through banks or other financial institutions, the Federal Reserve Bank will then become responsible for losses incurred up to 80 per cent of the total loss and the bank or financial institution accepts responsibility for the remaining loss. The object of this, of course, is to liberalize credit by removing the entire financial responsibility from the negotiating intermediary.

The second part of the instructions issued by Governor Black deals with the procedure and regulations covering private loans. Inasmuch as this has a more direct bearing upon and interest to our field, these regulations are reproduced below:

SECTION III. DIRECT TRANSACTIONS IN EXCEPTIONAL CIRCUMSTANCES BY FEDERAL RESERVE BANKS WITH ESTABLISHED INDUSTRIAL OR COMMERCIAL BUSINESSES.

(a) **Legal Requirements.**—A Federal reserve bank may exercise its authority to make loans to or purchase obligations of an established industrial or commercial business located in its district or to make commitments with respect thereto under subsection (a) of Section 13b of the Federal Reserve Act: (1) in exceptional circumstances; (2) when it appears to the satisfaction of the Federal reserve bank that such established industrial or commercial business is unable to obtain requisite financial assistance on a reasonable basis from the usual sources; (3) pursuant to the authority hereinafter granted by the Federal Reserve Board; (4) for the purpose of providing such established industrial or commercial business with working capital; (5) on a reasonable and sound basis; and (6) with respect to obligations which have maturities not exceeding five years.

(b) **Authorization by Federal Reserve Board.**—The Federal Reserve Board, pursuant to the provisions of subsection (a) of Section 13b of the Federal Reserve Act, hereby authorizes every Federal reserve bank, in exceptional circumstances, until such time as the Federal Reserve Board may revoke or modify such authority, to make loans to and purchase obligations of an established industrial or commercial business in its district, and to make commitments with respect thereto, subject to the provisions of the law and this regulation.

(c) **Applications by Established Industrial or Commercial Businesses for Loans, Purchases, or Commitments with Respect Thereto.**—Each application* by an established industrial or commercial business to a Federal reserve bank for a loan to, or the purchase of the obligations of, such business, or a commitment with respect to such a loan or purchase, must be transmitted to the Federal reserve bank of the district in which the principal place of business of the applicant is located and shall be submitted by such Federal reserve bank to the Industrial Advisory Committee of such district. Such application must be made in writing on a form furnished for that purpose by the Federal reserve bank and must contain or be accompanied by such information, agreements and documents as the Federal reserve bank may require.

(d) **Grant or Refusal of Application.**—In making any loan to or purchasing the obligations of any established industrial or commercial business or making any commitment with respect to such a loan or purchase, the Federal reserve bank shall ascertain to its satisfaction:

(1) That the circumstances are exceptional;

(2) That the obligor upon the obligation to be purchased or to evidence such loan is an established industrial or commercial business located in its district;

(3) That the proceeds of such loan or purchase are to be used to provide working capital for such business;

(4) That such obligor is unable to obtain requisite financial assistance on a reasonable basis from the usual sources;

(5) That the financial condition and credit standing of the obligor and indorsers, if any, upon such obligations, and the value of the security offered, if any, justify the granting of such accommodation on a reasonable and sound basis; and

(6) That the transaction will comply with the requirements of the law and of this regulation with regard thereto and, in so far as such reserve bank may be able to ascertain, does not involve a violation by any person of the provisions of section 22 of the Federal Reserve Act.

*Attention is invited to the requirements of subsection (h) and (k) of section 22 of the Federal Reserve Act quoted in the appendix to this regulation, with regard to material statements or overvaluation of security in connection with applications of this kind and with regard to the giving or receiving of fees, commissions, bonuses or things of value for procuring or endeavoring to procure from a Federal reserve bank any credit accommodation, either directly from such Federal reserve bank or indirectly through any financial institution.

Casting Orders Lower—Other May Statistics

ORDERS for both steel and malleable castings were lower in May than in the preceding month, according to the Bureau of the Census. Lettings of fabricated steel plate, however, showed a slight gain. New orders for steel furniture were also slightly higher, but awards of steel and range boilers declined. Production of steel barrels was lower, but unfilled orders gained moderately.

Production of malleable castings in May, as reported by 112 manufacturers, amounted to 37,165 net tons, compared with 40,742 tons in the preceding month. May shipments were 39,493 tons, compared with 39,817 tons in April, while orders were 32,639 tons and 38,453 tons respectively.

Production of steel castings increased from 46,242 tons in April to 57,313 tons in May, according to reports by 164 manufacturers, but bookings declined from 63,142 tons in April to 46,831 tons in May.

New orders for fabricated steel plate, as reported by 46 firms, increased from 20,085 tons in April to 21,699 tons in May.

New orders for business furniture, reported by 32 manufacturers, amounted to $1,038,575 in May, compared with $971,643 in the preceding month. Shipments increased from $934,097 to $1,010,528.

May production of steel barrels, as reported by 31 makers, totaled 492,051 units, as against 657,185 in April,

while shipments declined from 658,216 to 489,186. Unfilled orders, as of May 31, amounted to 931,889 units as compared with 887,490 units at the end of April.

New orders for steel barrels booked during May by 68 manufacturers amounted to 277,086 sq. ft., compared with 440,562 sq. ft. in the preceding month. Orders for range boilers booked during May by 18 makers totaled 35,683 units, as against 39,326 in April. May production was 41,021 units, compared with 35,960 in the preceding month, while shipments were 41,358 and 36,681 respectively.

May production of babbitt metal by 39 makers was 2,425,556 lb., as against 2,527,677 lb. in April. Sales by the same makers were 1,889,745 lb. and 1,964,142 lb. respectively.

Merchant Shipbuilding Shows Increase

FURTHER increases in the volume of the world's merchant shipbuilding, especially in motor vessels, are shown by the returns of Lloyd's Register of Shipping for the quarter ended June 30 last. A gain of 137,000 gross tons, or about 13 per cent more than the total under way at the end of the March quarter, is reported in the returns, which cover all merchant vessels of 100 gross tons and upward under way in all countries except Russia, for which returns have not been available for some time.

The present world total of 1,216,340 gross tons is nearly 500,000 tons above the amount of shipping under construction at this time last year; and in comparison with the March quarter no decline in output is shown for any country except Spain. Great Britain and Ireland alone are now building 105,000 tons more than they were at the end of March. For the United States the increase during the last quarter was only 247 tons.

Lloyd's Register gives the comparison of work in hand during the last two quarters in Great Britain and Ireland, the United States, and the other shipbuilding countries, taken as a group, in the following table of gross tonnage:

	June 30, 1934	March 31, 1934
Great Britain and Ireland.	587,142	481,440
United States	27,581	27,334
Other countries	601,617	570,397
World total	1,216,340	1,079,171

Great Britain and Ireland are now building nearly one-half of all the merchant tonnage being constructed throughout the world, their proportion standing at 48.3 per cent, as compared with 44.6 per cent at the end of the March quarter. The United States has only 2.3 per cent, as against 2.5 per cent in March, and the other countries, taken as a group, are now building 49.4 per cent of the total, as contrasted with 52.9 per cent in the March quarter.

Steel Producing Capacity Reached All-Time Peak During 1933

CAPACITY to produce steel ingots in the United States reached a total of 69,390,625 gross tons in 1933, according to the American Iron and Steel Institute. This is an increase of 1,191,449 gross tons, or 1.7 per cent, over the previous year and is the largest capacity ever reported for the industry.

The 1,191,449 gain in ingot capacity last year is the smallest in a decade, with the exception of two years when there were decreases. In 1925 capacity declined 2,594,383 gross tons and in 1932 a loss of 99,780 gross tons was reported. The average increase over the past decade has been 1,095,220 gross tons per year. The total gain in capacity during the past 10 years has been 10,952,202 gross tons, of which 6,323,061 has been registered since the end of 1929.

Capacity for basic open-hearth ingots showed the largest gain, increasing from 58,609,140 to 59,622,517, a net gain of 1,013,377 gross tons. Other increases in ingot capacity were: acid open-hearth, 79,306 to a total of 961,296 gross tons, and electric steel ingots, 102,152 to a total of 895,112 gross tons. The capacity for Bessemer ingots remained the same at 7,895,000 gross tons, while the crucible capacity declined from a total of 20,086 gross tons to 16,700 gross tons.

Capacity to produce pig iron and ferroalloys increased 654,086 gross tons, or 1.3 per cent, in 1933, to a total of 51,110,061 and the capacity for steel castings declined 29,104 gross tons, or 1.4 per cent, to 1,963,151 gross tons.

The capacity for pig iron production last year actually increased 668,086 gross tons to a total of 50,321,661, but the ferroalloy capacity declined 14,000 gross tons to a total of 788,400.

	Steel Ingots	Steel Castings	Pig Iron and Ferroalloys
1924	58,438,420	2,698,385	53,434,695
1925	55,844,033	1,968,498	51,150,390
1926	57,999,171	2,033,076	52,411,900
1927	59,435,766	2,029,334	50,532,350
1928	61,759,466	2,024,923	51,233,895
1929	63,067,546	2,097,995	51,656,680
1930	66,897,096	2,083,085	52,659,875
1931	68,298,956	2,041,145	51,740,175
1932	68,199,176	1,992,255	50,455,975
1933	69,390,625	1,963,151	51,110,061

Urges Increased Funds For Bureau of Standards

EMPHASIZING the necessity for continuance and expansion of what is described as "essential service to American science, technology, and industry," and urging on the part of the National Bureau of Standards that increased funds from PWA allotments be granted to the Bureau, a report of the committee on the National Bureau of Standards of the Business Advisory and Planning Council was made public recently by John Dickinson, Acting Secretary of Commerce.

The Council's Committee which compiled the report after more than six months' careful study was made up of the members of two previously existing committees which were studying the Bureau—the committee of the Bureau of Standards of the Science Advisory Board and the visiting committee of the Bureau of Standards—and of three additional members of the Business Advisory and Planning Council, making a total membership of eight.

The Science Advisory Board was created by President Roosevelt about a year ago. The visiting committee of the Bureau of Standards is composed of five prominent individuals who are connected with the fields with which the Bureau of Standards is concerned, and who are not on Government payrolls. The members are selected by the Secretary of Commerce in accordance with a provision of the Organic Act creating the Bureau. The Business Advisory and Planning Council was established in June, 1933, by Secretary of Commerce Roper and has as a function the advising of the Department of Commerce on its activities.

The report pointed out that due to the severe cut in the Budget of the Bureau in the last year, and because of the increased expense involved in its work of testing for various Federal Departments and State organizations which, according to the Organic Act establishing the Bureau, is done without charge to the Government agencies, funds remaining for other fundamental services of the Bureau are reduced to drastically small proportions. The report demonstrates that since 1932 "the actual reduction in funds to support the authorized work of the Bureau amounts to about 70 per cent." The Committee recommends that direct appropriations be made to cover the testing done for other Departments, in order that fundamental scientific work may not be crowded out. Resolutions from the American Association for the Advancement of Science, the American Chemical Society, the American Institute of Electrical Engineers, the American Physical Society, and the American Society of Mechanical Engineers support the recommendations in urging that funds be appropriated enabling the Bureau to maintain its testing and other scientific work.

Iron and Steel Exports and Imports Gained in May

Imports of Iron and Steel Products into the United States

(In Gross Tons)

	May		Five Months Ended May	
	1934	1933	1934	1933
Pig iron	8,628	9,548	60,218	51,563
Sponge iron	111	52	432	115
Ferromanganese and spiegeleisen*	3,422	3,890	13,296	12,315
Ferrochrome†	14	....	34	21
Ferrosilicon‡	87	....	233	4
Other ferroalloys	33	....	33	1
Scrap	6,975	4,370	23,748	5,460
Pig iron, ferroalloys and scrap	*19,270*	*17,860*	*97,994*	*69,479*
Steel ingots, blooms, etc	60	17	395	109
Wire rods	1,236	961	5,355	4,634
Semi-finished steel	*1,296*	*978*	*5,750*	*4,743*
Concrete reinforcement bars	90	371	417	1,272
Hollow steel bars	64	57	306	386
Merchant steel bars	1,923	1,099	7,315	7,032
Iron bars	48	77	295	149
Iron slabs	....	....	1	1
Boiler and other plate	22	27	71	109
Sheets, skelp, and saw plate	174	417	2,053	4,550
Tin plate	25	21	55	182
Structural shapes	1,946	2,113	8,081	9,471
Rails and rail fastenings	201	312	1,099	706
Welded pipe	54	243	746	1,422
Other pipe	141	80	1,624	504
Barbed wire	1,333	445	4,528	4,517
Round iron and steel wire	260	137	1,130	1,129
Flat wire and strip steel	92	87	578	329
Wire rope and strand	55	117	587	642
Other wire	3	108	223	773
Hoops and bands	1,350	1,131	5,909	6,435
Nails, tacks, and staples	456	485	2,630	2,993
Bolts, nuts, and rivets	35	34	154	123
Other finished steel	495	25	610	252
Rolled and finished steel	*8,767*	*7,386*	*38,412*	*42,977*
Cast iron pipe and fittings	4	87	7	315
Castings and forgings	128	63	617	378
Total	29,465	26,374	142,780	117,892

*Manganese content only.
†Chromium content only.
‡Silicon content only.

Exports of Iron and Steel from the United States

(In Gross Tons)

	May		Five Months Ended May	
	1934	1933	1934	1933
Pig iron	473	88	1,626	1,091
Ferromanganese	....	1	14	1
Scrap	132,725	89,328	595,733	281,568
Pig iron, ferroalloys and scrap	*133,198*	*89,417*	*597,373*	*282,660*
Ingots, blooms, billets, sheet bars	2,452	172	4,612	666
Skelp	31,882	1,102	36,809	2,092
Wire rods	2,083	532	13,259	4,914
Semi-finished steel	*36,417*	*1,806*	*54,680*	*7,672*
Steel bars	4,427	1,516	19,040	6,807
Alloy steel bars	344	197	1,585	542
Iron bars	262	32	508	161
Plates, iron and steel	2,717	881	13,877	2,190
Sheets, galvanized steel	4,629	2,958	25,900	11,690
Sheets, galvanized iron	187	134	693	276
Sheets, black steel	8,147	2,290	33,135	10,657
Sheets, black iron	455	104	1,552	638
Hoops, bands, strip steel	2,732	1,706	13,664	6,460
Tin plate, terne plate	10,541	4,189	86,931	18,422
Structural shapes, plain material	4,932	572	12,223	2,861
Structural material, fabricated	1,231	1,568	7,700	5,187
Tanks, steel	147	7	3,425	727
Steel rails	5,311	1,362	40,889	6,178
Rail fastenings, switches, frogs, etc	889	171	10,076	988
Boiler tubes	676	251	2,738	1,662
Casing and oil line pipe	8,677	3,933	28,515	13,170
Pipe, black and galvanized, welded steel	3,442	2,615	19,417	9,133
Pipe, black and galvanized, welded iron	420	49	998	434
Plain wire	3,054	889	15,418	2,917
Barbed wire and woven wire fencing	3,544	2,755	15,520	8,224
Wire cloth and screening	93	37	317	220
Wire rope	236	109	1,199	674
Wire nails	1,402	668	5,995	2,661
Other nails and tacks	421	320	2,162	1,395
Horseshoes	2	2	52	32
Bolts, nuts, rivets and washers, except track	436	264	2,004	1,284
Rolled and finished steel	*69,354*	*29,579*	*365,533*	*115,591*
Cast iron pipe and fittings	499	878	4,974	2,647
Malleable iron screwed fittings	247	193	1,256	771
Car wheels and axles	239	222	1,504	1,906
Iron castings	597	97	3,403	907
Steel castings	168	48	809	271
Forgings	441	403	1,647	1,362
Castings and forgings	*2,191*	*1,841*	*13,593*	*7,864*
All other	598	309	2,589	1,382
Total	241,753	122,952	1,033,768	415,169

TOTAL exports of iron and steel from the United States in May were 241,753 tons, compared with 201,539 tons in April of this year and with 122,952 tons in May of last year.

Scrap continued to be the leading export item, amounting to nearly 60 per cent of the total. Japan continued to lead in the demand for this item, taking 73,124 tons of the total of 132,725.

China was our best customer for heavy rails, taking 4904 tons of the total of 5311 tons. Canada was the leading consumer of American black steel sheets, getting 3417 tons of a total of 8147 tons. Tin plate demand abroad was fairly evenly divided with Argentina leading and Japan, China and Mexico following in the order named.

Imports of iron and steel, in May, totaled 29,465 tons, compared with 26,862 tons in April and with 26,374 tons a year ago. Netherlands supplied us with 5247 tons of pig iron of the total of 8628 tons. The bulk of our imported iron ore came from Chile, amounting to 152,758 tons out of a total of 202,096. More than half of our imported manganese ore came from the Soviet.

Distribution of exports and imports by classes and origins are shown in the accompanying tables.

Sources of American Imports of Iron and Manganese Ores

	May		
	Iron Ore		Manganese Ore
	1934	1933	1934
Canada	167	....	....
Cuba	22,000	11,000	....
Chile	152,758	....	....
Spain	200	....	....
Norway	7,467	....	....
Sweden	....	....	....
French Africa	6,600	....	....
Russia	7,500	9,650	10,431
India	....	....	1,988
Brazil	....	....	958
West Africa	....	....	....
Other countries	5,404	....	3,955
Total	202,096	20,650	17,332

United States Imports of Pig Iron by Countries of Origin

(In Gross Tons)

	May		Five Months Ended May	
	1934	1933	1934	1933
United Kingdom	50	4,050	150	5,000
British India	1,902	3,290	15,017	23,721
Germany	....	100	....	234
Netherlands	5,247	1,683	39,324	17,367
Canada	836	425	3,935	844
France	....	....	....	....
Belgium	....	....	50	....
Norway	391	....	793	....
Sweden	25	....	225	2,803
All others	177	....	724	1,628
Total	8,628	9,548	60,218	51,597

June Steel Ingot Production 10 Per Cent Under Previous Month's Total

STEEL ingot production in the 26 working days of June amounted to 3,015,972 gross tons, according to the American Iron and Steel Institute, a decline of 10 per cent from the revised May total of 3,352,695 tons. In June, 1933, production was 2,564,420 tons. Approximate daily output of steel in the last month was 115,999 tons, compared with 124,174 tons in May and with 98,632 tons in June, 1933. June operations were at the rate of 52.68 per cent of capacity, which stood at 68,478,813 gross tons on Dec. 31, 1933, as compared with 67,386,130 tons one year before. May operations were at 56.39 per cent of revised capacity, compared with 45.37 per cent in June of last year.

Ingot output in the first six months of the year amounted to 16,180,889 tons, as compared with 8,874,388 tons in the corresponding 1933 period.

MONTHLY PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Gross Tons)

Reported for 1933 by Companies Which Made 97.82 Per Cent of 1933 Ingot Output

1933	Open-Hearth	Bessemer	Calculated Output All Companies: Monthly	Calculated Output All Companies: Daily	No. of Working Days	Per Cent Operation‡
January	885,663*	109,000	1,016,870†	39,110†	26	17.99†
February	922,798*	126,781	1,073,012†	44,709†	24	20.57†
March	784,111*	94,509	898,236†	33,268†	27	15.30†
April	1,180,823*	135,217	1,345,422†	53,817†	25	24.76†
May	1,716,425*	216,841	1,976,428†	73,201†	27	33.68†
June	2,211,652*	296,765	2,564,420†	98,632†	26	45.37†
Six Months	7,701,472*	979,113	8,874,388†	57,254†	155	26.34†
July	2,743,326*	355,836	3,168,354†	126,734†	25	58.30†
August	2,430,663*	370,370	2,863,569†	106,058†	27	48.79†
September	1,991,204*	242,014	2,283,079†	87,811†	26	40.40†
October	1,847,690*	191,673	2,084,894†	80,188†	26	36.89†
November	1,331,029*	156,939	1,521,189†	58,507†	26	26.92†
December	1,629,495*	129,834*	1,798,606†	71,944†	25	33.10†
Total	19,674,879*	2,425,779*	22,594,079†	72,884†	310	33.53†

* Revised. † Adjusted.

‡ The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1932, of 67,386,130 gross tons for open-hearth and Bessemer steel ingots.

Reported for 1934 by Companies Which Made 99.39 Per Cent of Ingot Production in 1933

1934						
January	1,786,467	172,489	1,970,979*	72,999*	27	33.15*
February	1,993,638	175,873	2,182,826*	90,951*	24	41.31*
March	2,540,143	203,904	2,760,888*	102,255*	27	46.44*
April	2,622,372	257,482	2,897,529*	115,901*	25	52.64*
May	3,000,624	331,620	3,352,695*	124,174*	27	56.39*
June	2,714,983	282,592	3,015,972	115,999	26	52.68
Total	14,658,227	1,423,960	16,180,889	103,724	156	47.11

* Revised.

‡ The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1933, of 68,478,813 gross tons for open-hearth and Bessemer steel ingots.

Will Promote Market Research in Enameling

FORMATION of an educational bureau organized to promote technical and market research, advertising and industry contact for the porcelain enameling and kindred industries has been announced by the Porcelain Enamel Institute. E. L. Lasier, Titanium Alloy Mfg. Co., Niagara Falls, N. Y., is chairman.

The bureau will consist of four divisions: (1) market research section; (2) technical research section, of which Richard H. Turk, Porcelain Enamel & Mfg. Co., Baltimore, is chairman; (3) advertising and sales promotion section, of which R. A. Weaver, Ferro Enamel Corpn., Cleveland, is chairman, and H. Dana Chase, Chicago Vitreous Enamel Product Co., Cicero, Ill., is vice-chairman, and (4) industry contact section, whose chairman is Bennett Chapple, American Rolling Mill Co., Middletown, Ohio. A chairman for the market research section and vice-chairmen for the remaining sections will be announced later.

Engineers to Appraise Recovery Program

PLANS for a nine-day mid-summer conference of engineers on problems related to industrial recovery and reconstruction have been announced by Harvey N. Davis, president of the Stevens Institute of Technology, Hoboken, N. J. The sessions of the fourth annual economic conference of engineers will begin on Saturday evening, Aug. 11, and will continue through Sunday, Aug. 19, during which period there will be 25 scheduled meetings having as their general theme, "An Economic Appraisal of the New Deal." As in previous years, the conference will be held at the Stevens engineering camp at Johnsonburg, N. J.

This annual conference, initiated in 1931, has had as its sponsors engineering alumni associations of Brown, Columbia, Cornell, Harvard, Massachusetts Institute of Technology, Princeton, Rensselaer, Stevens, and Yale; also the American Society of Mechanical Engineers, the American Institute of Chemical Engineers, and the American Association for Adult Education. Approximately 100 graduates of 28 colleges of engineering attended the conference of 1933.

At the final session of the conference on Aug. 19, Gen. Hugh S. Johnson, National Recovery Administrator, will speak. General Johnson's intention is to deliver, through the conference, a message to the engineering profession.

IN the June 14 issue of THE IRON AGE it was erroneously reported that Cleveland Steel Products, Inc., had been organized to take over the Cleveland Steel Products Corpn., Cleveland. This statement has been denied by W. J. Smith, vice-president and general manager of the corporation. He has stated there has been no change in the incorporate name, nor has a new corporation been formed to take over the company, as had been reported previously. Cleveland Steel Products Corpn. manufactures roller bearing universal joints for automotive, marine and industrial purposes, and rotary wall flame oil burners, high pressure atomization-type oil burners, and automatic boiler-burner units.

Experiments on the effect of added phosphorus in the case of low-carbon steel were reported on page 31 of THE IRON AGE of June 28. The tests showed an increase in tensile strength with increase in the phosphorus content but a decrease in elongation. It was otherwise stated in the original transmission of the report of the committee in charge of the tests submitted to the American Society for Testing Materials.

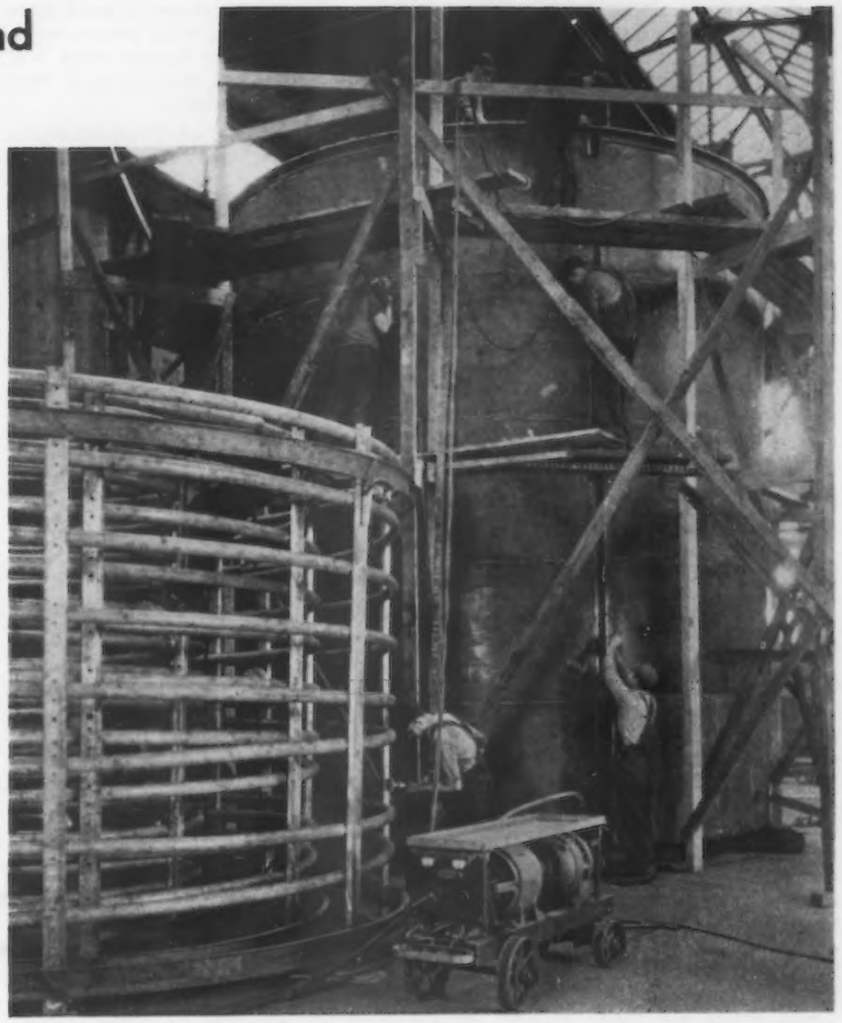
Federal Machinery Sales Co., 17 South Jefferson Street, Chicago, has been appointed sales representative in the Chicago and Milwaukee districts for the Baush Machine Tool Co., Springfield, Mass., and the George Gorton Machine Co., Racine, Wis.

Sivyer Steel Casting Co., Milwaukee, has announced the opening of a new New York office in charge of A. N. Diecks, Suite 810, 500 Fifth Avenue, New York. This office will specialize in the products of the Oil Refinery Division of Sivyer Steel Casting Co. and Sivyer stainless steel casting oil refineries.

LOUIS H. HEIN, INC., manufacturers' representative of 401 North Broad St., Philadelphia, has moved its offices to 2218 Chestnut St., Philadelphia.

Welding Stainless and Stainless-Clad Steel

By W. J. WACHOWITZ
President, Alloy Products Corpn., Waukesha, Wis.



This 38,000-gal. tank is a yeast propagator with attemperator coil and was fabricated by the Alloy Products Corpn., Waukesha, Wis. The tank is built of 3/16-in. 20 per cent Ingaclad stainless steel. All seams were butt-welded and polished on the inside. The tank is 18 ft. in diameter by 22 ft. high overall. The tank shell was built in four sections, the cover in two sections, with an additional bottom section, as shipment could not be made otherwise. The tank was then erected and assembled in the field and the seams of the five sections welded and ground smooth on the inside. In the bottom of the tank is an aerating system which has a 12-in. header built of No. 12 gage white pickled Allegheny metal, with all seams butt welded and ground smooth. There is approximately 54 ft. of longitudinal 5 and 7-in. half-round air header on which are welded fifty 1½-in. flanges with fifty 1½-in. white pickled pieces of National tubing with No. 14 gage wall and 29 in. long, with caps on the ends. In each tube four hundred ninety-six 1/16-in. holes were drilled, or a total of 24,800 holes. On top of this was inserted an attemperator coil consisting of three coils made of 3-in. No. 16 gage wall white pickled 18-8 Globe seamless tubing. The inside coil is 6 ft. 7 in. in diameter by 10 ft. high, the center coil is 11 ft. in diameter by 10 ft. high, and the outside coil 14 ft. 4 in. in diameter by 10 ft. high, making a total of approximately 1040 ft. of tubing in the unit, all rolled for the proper pitch to drain, with headers accommodating the three sets of coils as a unit.

OUR company is one of the pioneer fabricators and one of the few specialists in the country in designing, fabricating, and welding stainless steel equipment. We have manufactured approximately 800 various types and sizes of units which are being used in most of the nationally known dairy, food, brewery, chemical, packing and canning plants. From our experience and the repeat business which is being obtained, we are satisfied that stainless steel is here to stay. Our company has spent considerable time in research and development work producing stainless steel welding wire and flux, which we consider absolutely essential in the fabrication of stainless steel.

In the past two or three years we have made special efforts to have the steel mills produce stainless steel wire with low carbon content in order to eliminate corrosion and brittleness in the welds. We also found from experience that in producing equipment for various types of products having high acidity there is a tendency to attack the metal or the welded joints. This, in past years, was supposed to have been eliminated by annealing after fabrication, but 90 per cent of the larger equipment that had been annealed and not cooled properly had failed. We have done very little annealing, the reason being that we eliminated the work strains in the course of fabrication and in the use of proper welding methods. We have found first that the proper welding wire must be selected and coated with a flux which will eliminate oxide; secondly, proper preheating methods must be followed. In spite of the great care taken to produce a sound weld, we find it essential to have the welding machine run at the rated speed and the generator periodically cleaned so that it will produce a constant regular current. This will eliminate the small blowholes which often appear after welding. We have had very little of this trouble due to the fact that we specialize in this work and give great care to our design, our raw materials, our welding rod and our welding machines. A large number of units have been produced in recent months.

The past three years or so have been spent in research and development work fabricating stainless clad steel. Stainless clad steel is produced by placing two sheets of stainless with polished surfaces together and with insulating material between. These plates are then inserted in an ingot mold, and molten mild steel is poured in this mold to make the ingot. This is then rolled to the thickness of sheet desired. Then the four ends are sheared and two sheets are produced, with the stainless steel on one side and mild steel on the other. The thicknesses of sheets that can be obtained vary from No. 18 gage up to 1-in. plate. Stainless-clad steel, we feel, has great possibilities and advantages over solid stainless steel for certain applications in that it costs less and works easier.

When stainless steels were first introduced, considerable difficulty was encountered in attempting to weld the metal. In the course of time, improved welding rods, better welding control and better procedure were developed, with the result that today there is no difficulty in welding the chrome-nickel steels.

It is but natural with the introduction of the stainless-clad steels that the situation regarding the welding of such steels was at first quite similar

to that which existed at the time of the introduction of the solid stainless sheets. Here again, with the perfection of the welding procedure, the difficulties at first encountered have been eliminated, although some engineers are still under the impression that, from a corrosion-resisting standpoint, the weldability of the clad sheets is open to question.

With reference to the corrosion resistance of welds made from stainless-clad sheets, the principal question hinges on whether any carbon steel would be dissolved in the weld of the stainless steel. Our company has done considerable research and development work on this subject. Tests made subsequent to the development work have convinced us that, with proper welding procedure, the carbon steel will not dissolve in the stainless steel during the welding process.

A striking proof of the above statement is shown by the results of a test, in which two pieces of stainless-clad were welded together and the piece was then boiled in concentrated nitric acid for approximately 76 hr. at 185 deg. F. All of the mild steel adjacent to the weld was dissolved, which showed no visible effect whatsoever on the stainless part of the weld itself. This test is only one of many that we have conducted on various gages of such clad sheets.

One explanation of this corrosion resistance in and at the weld is that there is no precipitation in the weld metal because the mild steel absorbs the heat more rapidly than the solid stainless cladding. Therefore, there is a tendency for the stainless to anneal itself somewhat during the welding procedure.

Incidentally, we have also found that the stainless-clad steel is considerably easier to weld than the solid stainless sheet if the proper method is used. Other advantages of using the stainless-clad are that work strains do not develop as readily as they do with solid stainless steel because of the mild steel backing.

Southern Steel Buyers Protest Birmingham Prices

SOUTHERN Association of Steel Buyers and Consumers have filed a protest with the Federal Trade Commission on the differential which is charged on steel in Birmingham over Pittsburgh.

The formal complaint charges that "Prices of steel for fabricating, sheets, wire and wire products filed with the American Iron and Steel Institute set up a base price differential of $3 per ton in Birmingham over the Pittsburgh base price. These prices are set up in such a way as to make a monopoly possible in the fabrication and distribution of steel. These prices are made without due consideration as to cost of production and distribution.

"The set-up as outlined with the Institute restricts the territory of the Birmingham producers and fabricators to such an extent that it is only a matter of time until the larger proportion of these fabricators will be forced out of business on account of not having sufficient volume to operate their plants.

"In regard to basing points and prices on railroad supplies, the American Iron and Steel Institute made a base at each producing point with all prices equal, making it impossible for manufacturers who do not own a rolling mill to successfully compete with the mills in fabricating railroad supplies, which include track spikes, tie plates, axles and some other railroad supplies.

"On the bolts, nuts and rivets the practice of making a delivered price on identified structures discriminates against manufacturers of these articles who do not own a fabricating plant, inasmuch as the owner of the fabricating plant can get delivered price on this class of material which goes into identified structures. This practice not only discriminates against the bolt, nut and rivet manufacturer, but also against small fabricators who do not own machinery for manufacturing bolts and rivets.

"The present practice of fixing the base price of steel in Birmingham $3 per ton higher than in Pittsburgh and $2 per ton higher than in Chicago penalizes Southern mills and fabricators, without any compensating advantages."

Examples are cited to show that a number of recent contracts for erection in the southern district, because of the differential, have gone to suppliers from other districts.

The complaint is signed by W. C. Martin, president of the association, representing Lamson & Sessions Bolt Co., Ingalls Iron Works Co., Columbus Iron Works Co., Atlanta Plow Co., Chattanooga Boiler & Tank Co., Perfection Mattress & Spring Co., Hedges-Walsh-Weidner Co., Chicago Bridge & Iron Co., Continental Gin Co., Vulcan Rivet & Bolt Corpn.

... PERSONALS ...

C. LEROY HUGHES, safety and employment manager of the Carnegie Steel Co.'s New Castle, Pa., plant, has been named director of personnel and welfare work in the company's general office at Pittsburgh. He has been employed with the Carnegie Steel Co. since 1917. In addition to his other duties at New Castle he had been custodian of the plant property since 1931.

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LESLIE MCARTHUR has resigned as vice-president and general manager of the Bassick Co., Bridgeport, Conn. He is succeeded by W. A. ROSE, of Chicago.

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ALFRED J. KROENKE has been made general manager and director of the Geometric Stamping Co., Cleveland. He has been engaged in various industrial activities in Cleveland and was president of the Van Dorn Iron Works Co. of that city from 1927 until last year.

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WILSON OLIVER has been elected vice-president of Oliver Brothers, Inc., New York, succeeding WALTER C. MURTHA, who is retiring from active business. Mr. Oliver is the son of the late Thomas E. Oliver, founder, and until his death in 1921 president of the company. He has been with the company since 1913, except for an interlude of two and a half years' service in the army during the war. For the past 10 years he has been in charge of the company's Pittsburgh office, but last April moved to Chicago to open a new branch office there. Mr. Oliver is expected to continue to make his headquarters in Chicago.

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CHARLES G. CRABB, formerly executive vice-president of the General Hardware Corpn., has been appointed sales promotion manager of the Wrought Washer Mfg. Co., Milwaukee.

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K. B. BOWMAN has been appointed general superintendent of the steel plant of the Timken Steel & Tube Co., Canton, Ohio. He was graduated from Case School of Applied Science in 1921 and immediately became associated with the steel industry. He has been identified with the Central Steel Co., Central Alloy Steel Co., and Republic Steel Corpn. in various operating capacities. In 1931 Mr. Bowman joined the Timken company in the capacity of special statistician for F. J. GRIFFITHS, president, later being made manager of the statistical department. In 1933 he was promoted to director of production, in which capacity he acted until his appointment as general superintendent of the steel plant.

RALPH E. FLANDERS, Drawn by John Frew for The Iron Age

RALPH E. FLANDERS, who is to be next president of the American Society of Mechanical Engineers, is an example of a capable and very active business man and engineer who still finds time to serve in generous measure his Country and his profession.

In his capacity as president of the Jones & Lamson Machine Co., he is an able administrator of one of our best known machine tool building establishments. As president of the National Machine Tool Builders' Association and for many years in responsible and varied committee capacities, he has rendered valuable service to his immediate industry. His activities in behalf of the engineering profession, culminating in his recent nomination to the presidency of the A.S.M.E., have broadened his sphere of helpfulness.

His economic studies and thoughtful writings have been noteworthy, have brought him to the forefront of leadership in his field and led to his selection as a member of the American Engineering Council's committee on the Relation of Production, Distribution and Consumption, and a directorship of Social Science Research Council.

Since the establishment of the National Recovery Administration, his activities have broadened still further. He was called into service as a member of the Industrial Advisory Board. He is also a member of the Business Advisory and Planning Council, appointed by the Secretary of Commerce.

At the conference of code authorities in March of this year, his grasp of industrial, economic and social problems singled him out for a position of industrial leadership which has had profound effect.

With all of these responsibilities, Mr. Flanders retains the keen sense of humor which pleasurably seasons his speeches and conversations.

THE IRON AGE, in behalf of his many friends and admirers in the metal-working industry, is glad to pay this special tribute to one who has done so much for all of us.

THE WEEK IN WASHINGTON

NRA Interprets President's Price Order

Says Price Reductions in Government Bids Will Not Be Extended to Other Buyers

By L. W. MOFFETT
Resident Washington Editor, The Iron Age

WASHINGTON, July 10.—The NRA has interpreted the Presidential order of June 29 regarding bids on Government contracts to limit price reductions below code prices to Federal, State, municipal or other public authority only. Lowered prices, which can be slashed as much as 15 per cent, would not, according to this interpretation, be extended to other buyers.

Construed in the actual terms of the order, the interpretation is held to be sound. Nevertheless, the construction differs from that which the President has orally placed upon the order. For the President stated the order gives the public the advantage of the same reduction that a bidder offers to the Government agencies.

The order provides in effect that any person submitting a bid to any agency or instrumentality of the United States, or any State, municipal or other public authority, shall be held to have complied adequately with the requirements of a code "(a) if said bidder shall quote a price or prices not more than 15 per cent below his price or prices filed in accordance with the requirements of such code or codes; and (b) if, after the bids are opened, each bidder quoting a price or prices below his filed price or prices shall immediately file a copy of his bid with the code authority or other appropriate agency with which he is required to file prices."

A "Semi-Official" Interpretation

What has been called a "semi-official" interpretation of the order is published in *The Blue Eagle*, house organ of NRA, in its fourth issue under date of July 2.

"Application of the order is specifically limited to industries which are code-bound to bid in accord with previously posted prices and it in NO way alters other regulations adapting Government purchasing policies to the rules of NRA codes," this publication says.

"The modification order does NOT authorize the breaking of posted open prices in bidding on private work, code regulations remaining in full control. But, for the protection of both the industry and its consumers, the order requires that whenever a firm cuts below its posted price in bidding on Government work, it must, immediately after the bids are opened, file a copy of its bid with the appropriate price-reporting agency. However, the previously posted prices will remain in full force until and unless changed by their makers.

"Private customers having access to the posted open prices will also have access to the filed bids and will therefore know exactly what prices are being quoted to the Government and, it is expected, will guide their purchasing policies accordingly."

The statement goes on to say the purpose of the order is to restore, "within a reasonable range, the price competition of true sealed bids on all Government work without undoing the beneficial effects of price-reporting code requirements. The rule, it is declared, was instituted to meet repeated complaints of public purchasing agents who, though directed by law to buy from the lowest bidder, have been "insistently confronted by identical bids, set in accordance with previously filed open prices."

Further Interpretation May Be Forthcoming

It is reported that the NRA, which itself is apparently on the eve of a fundamental reorganization, may issue a further general interpretation, perhaps with the stamp of the legal division, or that return of the President from his cruise may be awaited in the event added action may be taken on the order. It is considered conceivable, however, in view of the disturbing effect of the order and the anxiety it has created in industry and among purchasers generally, that more definite action may be forthcoming soon either from the President or the NRA legal. It is also seen that because of their varied forms of construction, different interpretations may be necessary for numerous codes. In the case of the steel code it is contended that it is so drawn that it constitutes "a valid and binding contract by and among all members of the code," subject to Recovery Act provision that the President may from time to time cancel or modify any order, license, rule or regulation issued under Title I of the act. This contract, it has been urged, cannot be abrogated except upon agreement by the affected parties.

A ruling already has exempted the bituminous coal industry, apparently

because individual coal operators do not file prices. Rather they are fixed by code authorities, subject to approval by Presidential members.

The retail solid fuel industry likewise was exempted where emergencies have been declared and lowest reasonable costs determined in divisional code authorities. These rulings are understood to have been made with the approval of Division Administrator C. E. Adams, who also has jurisdiction over the steel code.

Aside from the rulings, however, the order has created disturbance. One reason is the concern as to the effect of the reduced prices made on Government contracts may have on purchasers generally, especially the larger buyers who are increasingly exerting pressure for reduced levels. It is obvious that this pressure has not come solely from Government purchasing agencies. The latter have a point in their favor that private buyers do not have, that of requiring them to make awards to lowest bidders, a legal requirement that appears to conflict with the principle, if not the actual terms of the Recovery Act.

Protests Being Made

At the same time protests are being made by private purchasers that the Federal Government has no moral right at least to compel price discrimination in favor of Government agencies to the disadvantage of private buyers, some of whom, it is claimed, purchase much more heavily in some lines than do some of the smaller governmental agencies; in some cases more heavily than all the governmental agencies combined, agencies that are supported by such buyers in the capacity of taxpayers. Whatever the logic of the contention may be, it is a source of serious consideration. It is held that while the Federal Government may plead that it is engaged or is about to engage in tremendous public works enterprises calling for vast quantities of materials of many kinds and should get reduced prices on a basis of quantity-buying, the same might be said for large private purchasers. Moreover, price differentials based on large-scale buying is done away with in some codes, including the steel code. The Government program, of course, represents much buying by private concerns through loans. But where the Government takes bids direct it would, under the order, get lower prices than would its borrowers who purchase direct from suppliers, yet the source of financing is identical — the United States Treasury. Also, the Government position is held to be inconsistent in other ways. For example, it has been pointed out that the Government on Aug. 15 will take bids on 24 naval vessels, one-half to be built in navy yards and one-half in private yards. The Government under the order as interpreted would get supplies for less than would private builders, and the disparity in costs of building in Government and private yards would become evident. Under the order there is certainly nothing which would permit industry to depart from code requirements as to wages and hours to offset the effect of reduced prices.

The legal division of NRA has issued a statement that the filing with the code authority of a bid price in accordance with the President's executive order of June 29 referring to tenders to the Government or subdivisions thereof does not effect a change in the bidders' filed base prices. This filing of the bid price is for general information and in the case of the steel code, for example, any change in the filed minimum base prices must be made in accordance with provisions of the code. Division Administrator C. E. Adams has so advised the code authority of the iron and steel code and of other codes.

The NRA statement says it is the opinion of its legal division that the filing with the code authority as prescribed by the executive order by a bidder, of a bid price quoted in accordance with the order and which is below his filed price, is for information only and such filing of a bid price does not effect a change in the bidder's base prices then on file and "any change in filed base prices to be made in accordance with the provisions of the code."

National Labor Board Gives Account of Stewardship

WASHINGTON, July 10.—Giving an account of itself as it was passing out to be succeeded by a new central organization, the old National Labor Board reported last Saturday that it and its 19 regional labor boards since inception of the board up to July 1, 1934, had handled cases directly affecting more than 2,000,000 workers. It was estimated that 1,800,000 had been returned to work, or kept at work, or had their other disputes adjusted. There was a total of 4277 cases of which 3532 were settled by the boards. Approximately two-thirds of these settlements were agreements. The board, as it left office, had 416 cases pending, to be transferred to the new National Labor Board, which took office yesterday.

The old board and its 19 regional boards mediated 1496 strikes, involving 1,070,000 workers, not counting many more thousands directly affected. Three-fourths of these strikes were settled. In addition, the board reported, 498 strikes were averted. Thus, it was stated, the boards in strike situations alone returned to work or kept at work 1,350,000 workers directly involved, or about 1,600,000 including workers affected.

Of the 4277 cases, the primary cause of complaint in 2741 cases was alleged violation of Section 7 (a), the collective bargaining provision of the National Recovery Act.

The old board was abolished by Presidential decree and the new three-man National Labor Board became the governing board over all existing boards, about 35 in all, setting up a tangle that will have to be straightened out.

The plan is to "liquidate" many of these boards as autonomous organizations. In addition to the regional labor boards are those established under some codes, such as the bituminous coal, textile and petroleum codes. There are also the National Steel Labor Relations Board and the Longshoremen's Labor Board. These latter two were established under the recently enacted Wagner resolution and neither is apt to be changed, though both are temporary, inasmuch as they are, in the words of President Roosevelt, on "a firm statutory basis." On the other hand it is reported that the National Automobile Labor Board might be "reestablished" to bring it under the Wagner resolution. Such a "reestablishment" in all probability would mean that the powers of the automobile board would be broadened.

The code boards likely will remain unchanged. They reflect self-government over labor disputes as conceived by NRA officials who are only too anxious to unload labor together with many other troubles upon industries themselves. This, at least, was the NRA policy. Supposedly it still is. However, its policies change so rapidly that they almost take on a day-to-day character. The present proposal is to bring about a fundamental change in NRA itself which would mean a three-man set-up, but how far this may go is also a matter of speculation and confusion, so common to many NRA activities.

Japanese plans for the creation of an aluminum industry in Formosa are nearing realization. A new company expects to establish a plant in Tako with an initial annual capacity of 6000 tons. The total Japanese aluminum consumption is about 20,000 tons yearly. It is proposed to produce mainly 99 per cent metal which can be used directly by the armament industry.

NRA Ship May Be Drydocked for Repairs

WASHINGTON, July 10.—Reshaping of the New Deal recovery program is being considered. Reports are current that overhauling of various alphabetical agencies will be involved. The most fundamental reorganization, it is said, will be effected in the NRA, and Administrator Hugh S. Johnson is reported to have made recommendations to the President for a rather thorough molting of the Blue Eagle. The General himself, however, on his vacation in New York last Saturday, said that if the President has any change under consideration it will have to come from him.

Present indications are that the public generally and business interests will first be sounded out before definite plans are determined. It is likely that much will depend on sentiment of the country derived during the political campaign before the program is mapped out.

The NRA automatically will go out of existence on June 16, 1935, unless continued by legislation. Business generally favors continuance of principles of the NRA, but for the most part wants it considerably simplified, as apparently does General Johnson himself. Even if it were allowed to expire through inaction by the administration or Congress, business sentiment probably would develop the continuance of some of its features, such as fair trade practices and other phases which would require no legislation. Minimum wages and hours also might be urged, for they are held to form a highly important factor in fair competition. Moreover, labor in all probability would insist upon them.

Reports of Reorganization Prevalent

Reports of a forthcoming reorganization of NRA have been circulated for some time. Tentative plans to re-shape other agencies were indicated when President Roosevelt selected Donald Richberg, NRA general counsel, to coordinate recovery agencies. The first public announcement indicative of these moves, however, came from Senator James Hamilton Lewis of Illinois. Speaking as Democratic whip of the Senate and as chairman of the Democratic Senatorial campaign committee, he has represented the President as being ready to modify the recovery program to the best interests of prosperity. It is stated the views presented by Senator Lewis were set forth to him by the President just before the latter departed on his trip to Hawaii.

The Illinois Senator said that the President desires to know where business feels that the legislation is inappropriate to its welfare or where some change in the legislation would best serve the general uses of legitimate business in the promotion of general prosperity in all branches of commerce and industry. He added that the President is anxious that in the present political campaign, the public shall be advised that there will be corrections and readjustments of anything necessary to make the legislation fit the needs that will serve the just purposes of prosperous business.

There are several plans actually said to be under consideration with regard to reorganizing NRA. Each, it is said, would bring about fundamental changes and would not call for legislation. The plan General Johnson is reported to have suggested, though the report has not been verified, is to do away with a single administrative head and to replace direction of the organization under a three-man board. The General himself might or might not be on the board, according to reports. The plan likewise is said to contemplate consolidation with the Federal Trade Commission. The NRA and the Federal Trade Commission have been about as far apart on policies as the North and the South Pole, and the two organizations have been almost as unfriendly as were the NRA and the Darrow Recovery Board, the latter recently abolished. Whether or not this consolidation therefore is in contemplation remains to be seen. Business and industry generally have had no especial liking for the Federal Trade Commission, with its vigorous opposition to anything that it considers smacks of so-called price-fixing. It has a positive aversion to the basing point system in the steel or any other industry and raked the steel code fore and aft in its report of some months ago on that code. It was almost as vigorous in attacking the code as was the Darrow board.

The plan is said to also call for a commerce court of some sort to settle cases coming before the NRA which develop legal disputes.

It is said that reorganization of both the AAA and the PWA is in mind. The plans evidently, however, are far from being in definite form but apparently rest with political reaction followed by work of Mr. Richberg in his new job as super-coordinator.

In the meantime, General Johnson has decided to take a well earned and long deferred vacation this summer and has turned over the active management of NRA to five of his principal subordinates. These will probably comprise G. A. Lynch, NRA administrative officer; George L. Berry and A. R. Glancy, division administrators; George W. Lee, assistant administrator for industry, and George Buckley, publicity advisor.

The General's vacation may not be all play, however, for he is reported to contemplate a speech-making tour to acquaint the country with what has been accomplished by his organization so far and what the future needs of the country may require from it.

U. S. Steel Offers Help To New Labor Board

WASHINGTON, July 10.—The National Steel Labor Relations Board has indicated that it will avail itself of offers of the United States Steel Corpn., and the Amalgamated Association of Iron, Steel and Tin Workers to assist and cooperate with the board. The board has announced receipt of word from Chairman Myron Taylor of the United States Steel Corpn., that the corporation is ready to supply the board with data bearing upon its relations with its employees.

Charlton Ogburn, New York, attorney for the Amalgamated Association, came to Washington last Friday and conferred informally with the board. Mr. Ogburn presented to the board considerable information concerning the situation in the steel industry, and gave assurance of assistance and cooperation in working out the problems which may arise in the industry, according to a Department of Labor statement.

$6,000,000 to Camden For Municipal Plant

WASHINGTON, July 10.—Allotment of $6,000,000 as a loan and grant to Camden, N. J., for the construction of a municipal electric light system and power plant, provided the New Jersey legislature enacts enabling legislation, has been announced by Public Works Administrator Harold L. Ickes.

Mr. Ickes said last Thursday that PWA had on its books 3601 non-federal allotments totaling $946,396,-919.90 that were estimated, in round figures, to result in $1,137,000,000 worth of construction work.

National Steel Corpn. has declared the regular quarterly dividend of 25c. a share on common stock, payable July 30 to stockholders of record on July 20.

Administration Hopes For Capital Goods Upturn

WASHINGTON, July 10.—The administration is hoping for a sharp impetus in the capital goods industries from operation of its huge housing program. It will call for large tonnages of pig iron and scrap for use in the manufacture of pipe, plumbing supplies and radiation units. Actual steel mill products, however, do not promise to be heavy inasmuch as there is no known plan to push a drive under the program for the construction of steel houses. So far as known here the view appears to be that the first cost of these houses would probably be greater than home builders generally would pay under the borrowing plan, though because of their durability they would be cheaper in the end. Steel, however, will be required in fair quantities from requirements for hardware.

Housing Director James A. Moffett, former vice-president of the Standard Oil Co. of California, has predicted that $500,000,000 worth of home modernization will be under way by fall and that this work ultimately will provide jobs for 5,000,000 directly and millions of others engaged in the construction and allied industries. Arriving in Washington last Saturday, he is quickly organizing the corporation which will have a staff of about 250 in rented quarters. His statement as to reemployment possibilities is looked upon generally as being extremely optimistic.

Mr. Moffett said that industrial leaders have informed him that in normal times $3,000,000,000 is spent on home building and repair work. He estimated that there has been a decline to about $300,000,000 in home construction at present.

His plan has three phases, one of which will be acted upon at a time. First, will be the home modernization plan; second, the mortgage insurance plan proposed to cut the cost of financing new construction, and, third, the national mortgage insurance associations. Included in the plan also is the refinancing of existing mortgages and the guaranteeing of deposits up to $5,000 in building and loan associations.

It is the opinion of Mr. Moffett that the corporation will have money flowing for home modernization within 30 days.

He said home owners will find nothing complicated about getting loans. All that is necessary, it was stated, is to apply for a loan to a building and loan association, a bank, or a similar financial institution. The loan, it was declared, should be much easier to obtain because of the Government's willingness to guarantee up to 20 per cent of the loan for home repairs and additions if the home owner's character and credit standing are good. Under present plans no security would be necessary for this sort of borrowing.

Code Doings and Undoings

Three Supplemental Codes Approved

THREE codes, two of them supplementary to the basic code for the machinery and allied products industry and one a division of the fabricated metal products manufacturing and metal finishing and metal coating industry, were approved last week.

The machinery and allied products codes approved, both of which become effective on Monday, July 16, cover the chemical engineering and equipment industry and the roller and silent chain industry, approval of the latter being granted with the proviso that the clause instituting a waiting period between the date of filing and effective date of open price lists be stayed pending further orders. In the chemical engineering code the administrator ordered deleted a clause under which the members of the industry, by assenting to the code held that they did not thereby assent to any modifications or changes thereof.

Both codes adopt the wage, hour and labor provisions of the basic code, set up code administration and provide for open price filing and ban selling below reasonable cost in times of emergency due to destructive price cutting.

The third code approved covers the prison equipment manufacturing industry and becomes effective July 15. It also adopts the wage, hour and labor provisions of its basic code, sets up a code authority of five persons, and forbids selling below cost except to meet competition.

* * *

Accounting System for Gray Iron Foundry

A UNIFORM cost and estimating system as proposed by the code authority for the gray iron foundry industry for general use in the industry was discussed at length last Friday in a hearing before Assistant Deputy Administrator J. R. L. Santos. The proposed system was presented by Henry Halstead, executive vice-president of the Gray Iron Foundry Institute, and was criticised by representatives of several of the larger members of the industry, who pointed out that they already had their own somewhat elaborate cost estimating systems in use and protested that to change at this time would seriously inconvenience them. Discussion of a way out of this difficulty was finally put over for a post hearing conference.

* * *

Code Authority—Flexible Hose

R. P. BARRY, formerly private secretary to Stuyvesant Fish, president of the Illinois Central Railroad, has been appointed as administration member of the code authority for the flexible metal hose and tubing manufacturing industry.

* * *

Lead Industry—Code Authority

THE National Recovery Administration has announced approval of the following members of the Code Authority for the Lead Industry:

Clinton H. Crame, St. Joseph Lead Co., New York, N. Y.

F. H. Brownell, American Smelting and Refining Co., New York, N. Y.

F. M. Carter, National Lead Co., New York, N. Y.

F. Y. Robertson, U. S. Smelting & Refining Co., New York, N. Y.

James F. McCarthy, Hecla Mining Co., Wallace, Idaho.

G. W. Lambourne, Park Utah Consolidated Mines Co., Salt Lake City, Utah.

John A. McCarthy, United Metals Selling Co. (Agents for International Smelting Co.), New York, N. Y.

R. M. Roosevelt, Eagle-Picher Lead Co., Cincinnati, Ohio.

P. E. Sprague, Metals Refining Co., Hammond, Ind.

W. Y. C. Hunt, Reynolds Metals Co., New York, N. Y.

W. E. Wormser, 420 Lexington Ave., New York, N. Y.

* * *

Tank Car-Service Code Authority

NATIONAL RECOVERY ADMINISTRATOR HUGH S. JOHNSON has announced the appointment of J. E. O'Brien, 135 S. LaSalle Street, Chicago, as administration member on the Code Authority of the tank car-service code.

Mr. O'Brien is a member of the American Society of Mechanical Engineers and during the world war served on the committee of standards for locomotives and cars of the United States Railroad Administration.

* * *

Wire and Iron Fence Code Approved

NATIONAL RECOVERY ADMINISTRATOR HUGH S. JOHNSON has approved a code of fair competition for the complete wire and iron fence industry as a division of the fabricated metal products manufacturing and metal finishing and metal coating industry.

Effective July 13, the code adopts the wage, hour and labor provisions of the basic code and provides for the election of a supplementary Code Authority of nine persons, two of whom shall be elected by a majority vote of all the members of the industry, one by a majority vote of all members of the industry not members of the Wire and Iron Fence Association and six by a weighted vote of the members of the Association.

The Code Authority is instructed, under the code, to prepare a uniform cost accounting system and in the event of an emergency in the industry due to destructive price cutting and with the approval of the Administrator, to fix a lowest reasonable cost for industry products below which no member shall

sell goods during the emergency. Selling below individual costs is also forbidden.

The Administrator's approval is granted with the proviso that the clause creating a waiting period between the date of filing and effective date of price lists be stayed pending further order. General Johnson also stayed other clauses in the code providing for the registration of members of the industry.

* * *

Proposed Budget under Drop Forging Code

DEPUTY ADMINISTRATOR J. G. COWLING has announced that all objections to the proposed budget for the support of the code authority for the drop forging industry and to the request for exemption from Administrative order X-36, which requires industry to contribute only to the code authority under which the largest amount of their product is made, should be submitted to him in Room 4023 of the Department of Commerce Building prior to Tuesday, July 17.

The annual budget proposed totals $64,300, to be contributed as follows:

"Each of the assessments for June, July and August shall be for an amount representing three-tenths of one per cent of the volume of each member company. The volume on which each monthly levy is made shall be calculated by the volume of business done by each member company during the second preceding month prior to the month to which assessment applies."

* * *

Steel Tubular and Firebox Boiler Code

ACTING DIVISION ADMINISTRATOR BARTON W. MURRAY has notified the Code Authority for the steel tubular and firebox boiler industry that their plan for handling trade practice complaints with the Code Authority sitting as a trade practice complaints committee, has been approved by the National Recovery Administrator.

The members of the Code Authority are: Chairman, R. B. Dickinson, Kewanee Boiler Corpn., Kewanee, Ill.; Homer Addams, president, Fitzgibbons Boiler Co., New York City; Frank Metcalf, president, International Boiler Works, East Stroudsburg, Pa.; J. F. Johnston, president, Johnston Brothers, Inc., Ferrysburg, Mich.; Charles Tull, president, Spencer Heater Co., Williamsport, Pa.; J. R. Collette, vice-president, Pacific Steel Boiler Corpn., Detroit, Mich.; Col. Samuel Fleming, Administration Member, Harrisburg, Pa., and R. E. Locke, secretary, Middletown, Pa.

* * *

Supplementry Code for Replacement Axle Shafts

NATIONAL RECOVERY ADMINISTRATOR HUGH S. JOHNSON has announced approval of the supplementary code of fair competition for the Replacement Axle Shaft Manufacturing Product Group of the Replacement Parts Division of the Automotive Parts and Equipment Manufacturing Industry.

The labor provisions of the supplement are the same as those contained in the basic code approved Nov. 8, 1933.

The order of approval, however, stipulates that the provisions of the code prescribing a waiting period between the time of filing with the Code Authority and the effective date of revised price lists or revised terms and conditions of sale, are stayed pending further order.

Code Budget Sought for Pipe Nipples

THE National Recovery Administration today announced receipt of a request from the Code Authority of the pipe nipple manufacturing industry for approval of an amendment to its code which would permit the Authority to incur, and collect from members of the industry for, reasonable obligations incident to code administration.

Notice was given that any criticisms of, objections to or suggestions concerning this proposed modification must be submitted to Deputy Administrator Joseph Dilworth, Room 4036, Department of Commerce Building, Washington, D. C., prior to July 18, 1934.

* * *

Complaints Board for Metal Treating Industry

ACTING DIVISION ADMINISTRATOR BARTON W. MURRAY today announced that the plan of handling trade practice complaints as submitted by the Code Authority for the metal treating industry had been approved together with the members of the Complaints Board as proposed. The members are:

Ralph J. Hoensheid, 6100 Tiromen Ave., Detroit, Mich.; W. S. Biddle, 1408 East 47th St., Cleveland, Ohio; Theodore Wiedmann, 1815 Sedgley Ave., Philadelphia, Pa.; A. D. Bach, 9 Alger St., S. Boston, Mass., and Arthur H. Nuesse, 1333 W. Pierce St., Milwaukee, Wis.

* * *

Tack and Small Staple Code

THE National Recovery Administrator has approved the application of the cut tack, wire tack and small staple manufacturing industry for a supplementary code to the basic code of fair competition for the fabricated metal products manufacturing and metal finishing and metal coating industry, approved Nov. 2, 1933.

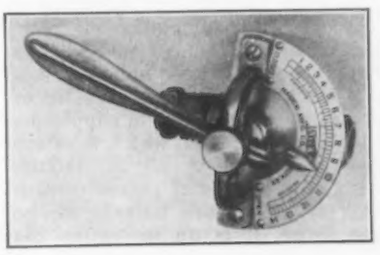
The code defines the fair trade practices applicable to this branch of the industry and embraces the labor provisions of the basic code.

New Valves Permit Close Control of Oil Burners

MICRO regulating valves designed to permit minute regulation of oil to industrial heating burners, easy duplication of previous valve settings and operating conditions, and savings in fuel have been placed on the market by the Hauck Mfg. Co., 128 Tenth Street, Brooklyn, N. Y. This valve, for either high or low pressure oil burners, is also said to minimize clogging or "fading away" of flame with any oil, even the heaviest residues and tar.

Operation is based on a simple principle. The valve has a triangular-shaped opening in the ring seat and a rectangular slot in the cup-shaped valve plug, producing an accurately and minutely variable orifice at a point where the rectangular slot in cup-shaped portion of the valve plug meets the stationary, triangular opening in the ring seat. As the valve plug is turned, the area of the orifice is increased or decreased by minute increments.

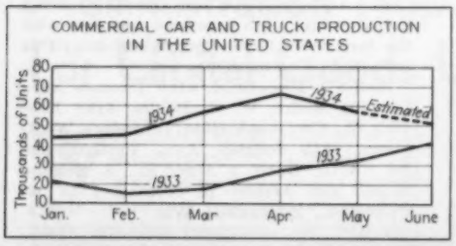
Sediment which clogs a needle valve is said to pass freely through the Micro regulating valve, two types of which are offered. One is the Micro increment valve which is operated by a lever handle fitted to the valve stem and can be instantly opened full or shut off. These are suitable for attachment to automatic control mechanisms. The other is the Micro vernier valve, which is operated by means of a vernier motion obtained through a worm and worm wheel mounted directly on the valve stem. Several sizes of each type are available. All are fitted with a hollow cap for steam connection to prevent solidifying of tar and other viscous fluids.



Removing Internal Stress In Tie Rods

RECENT tests in the metallurgical division of the National Bureau of Standards, Washington, have indicated that internal stresses set up by rolling, in 1050 carbon steel tie rods for airplanes, can be very largely removed by heating 30 min. to 600 to 700 deg. F. This heat treatment does not lower the mechanical properties of the material very materially. In stainless steel tie rods, about 50 per cent of the internal stress can be removed by heating 30 min. at 900 deg. F. After this treatment the mechanical properties are considerably higher than in the "as-received" condition.

After heating at a temperature of 900 to 1000 deg. F., however, the resistance to corrosion, as shown by the boiling-nitric-acid test, decreases sharply. The temperature control in heat treatment of this material would therefore have to be very carefully controlled to obtain an appreciable relief of internal stress without impairing the corrosion resistance. It is probable that the presence of titanium or columbium often recommended as a "stabilizer" in the stainless steel may allow higher temperatures to be used.



THIS WEEK ON THE

July Output To Be 280,000 Units; Automobile Outlook Cheerful

DETROIT, July 10.

AS the final figures come in for June production and operating schedules ahead are surveyed, the automobile industry is cheered by the situation in which it finds itself. It must be admitted, however, that if the records of the three leading manufacturers were eliminated, the remainder of the industry would have a slim performance to point to.

In June Ford and Chevrolet ran a close race for first place in total assemblies, the former making 98,445 units and the latter 98,147. Plymouth has announced that its output last month was 43,072 units. Thus the Big Three turned out 239,664 units out of the entire industry's estimated production of 320,000 units, or 75 per cent.

The record of these three leaders for the first six months of the year parallels that of last month. Up to June 30, Ford had built 536,637 units, Chevrolet 525,093 and Plymouth 235,215. This totals 1,296,945 units, or about 73 per cent of the industry's assemblies for that period of approximately 1,770,000 units.

July Output to Be High

July holds exceptional promise because of the continued high operating rate of these three companies, which have scheduled a total of 225,000 units. The industry, as a whole, should make 280,000 cars this month, as against 239,628 units in the same month a year ago. It is a notable fact that unless present plans are changed the latter part of the month, production in July, which usually feels the effects of a decided seasonal drop, will be considerably in excess of the 260,645 units in June, 1933, the peak month of last year.

The well-sustained buying of cars is accounted for principally by the recent price reductions which brought to an end what was termed by some automotive executives as a buyer's strike. Another influence in the State of Michigan, particularly during the final days of June, was the fact that on July 1 a law went into effect making compulsory the equipment of all new cars with safety glass in all windows and the windshield. Dealers used this law, which already has increased the retail prices of cars bought within the State, as a sales lever.

August looms as a month of good production volume, although it is impossible at this time to venture an accurate prediction of the number of units to be assembled, because tentative schedules probably won't be established until late this month. Unless signs are misleading, output of the industry in the third quarter will at least equal that in the corresponding quarter of 1933, whereas five or six weeks ago motor car sales executives shook their heads dubiously when looking ahead at July, August and September.

Fill-in Steel Orders Placed

As proof that automobile companies had not counted on such generous schedules this quarter, steel mills the past week have received orders at the new prices to supplement orders already placed which were supposed originally to fill all requirements until the end of present production runs. While this tonnage has not been large, it is an indication that steel buying on the part of the automobile industry has not entirely halted.

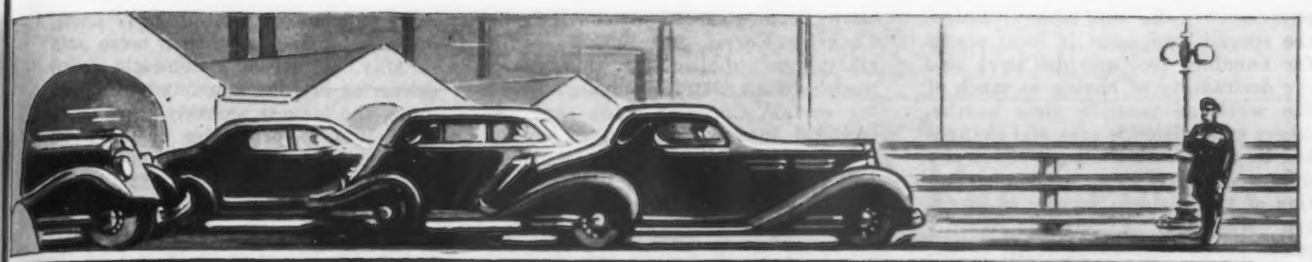
The conviction is growing in local steel circles that initial steel purchases for 1935 cars will begin about Aug. 15. The feeling is general that mills can anticipate considerable automotive tonnage in the latter half of August and in September.

Manufacture of 1934 models will be completed by some companies in August and by others in September. Indications are that the usual lull in operations caused by the tooling up of plants for new models will occur late in September and in October. It is expected that many new cars will be introduced prior to the end of the year, with the Pontiac six probably the first to be announced. It is not likely to be ready before October. It will sell at a slightly higher price than the Chevrolet.

Large Equipment Order Booked

One prominent automotive company has placed orders for about $800,000 worth of equipment to be used in connection with 1935 models. With this single exception, tooling programs still are being held in abeyance. Pursuing a program of improving its product and cutting manufacturing costs, an important automobile maker is said to have bought equipment for machining brake drums at a cost of $25,000.

It is understood that Packard will not purchase any stamping equipment in connection with the tooling program for its light eight. It already is believed to have more machinery of this type than it needs. This year it is reported to have been using some



ASSEMBLY LINE

By BURNHAM FINNEY
Detroit Editor, THE IRON AGE

of this excess equipment making stampings for Chrysler divisions. The light Packard will not be out as early as the trade expected, the announcement date probably being very late in the year.

Repercussions from the steel price decline are continuing to reverberate through the local trade. Large automotive steel buyers are believed to have felt several weeks ago that the prices first announced for third quarter would not hold. In certain cases they are understood to have quietly told parts suppliers that they need not worry about having to pay sharply higher prices for steel, because they were of the opinion that the newly-established price structure would be modified.

Automobile manufacturers declare that plenty can be said on behalf of lower steel prices and of changes in the steel code. They assert that obviously steel mills have been built at Detroit not only because of their proximity to customers' plants, but also because of production economies and of the saving of transportation charges to southern Michigan from other steel-making centers. It is natural that these economies should be passed along to users as an inducement for placing business with local mills.

Motor Car Makers Object to Steel Set-Up

They further assert that no justification existed for instituting steep increases in strip and sheet prices for the third quarter, following on previous sharp advances in the last year. They are willing to admit that steel prices sank to unnecessarily low and distressing levels during the worst days of the depression and that some rebound was to be expected. In addition, they grant the justification of raises traced to increased wages and raw materials costs under NRA. But they are not willing to subscribe to the theory, on which they claim the steel industry has been basing its policy in recent months, of setting prices of such levels that mills which have no place in the modern manufacturing scheme can operate successfully indefinitely.

In this connection, the automobile people cite their own case. Their code makes no attempt to control prices, leaving the industry free to charge whatever it thinks it can get. Any company which finds it cannot exist on the basis of prices established by leading manufacturers must either modernize its methods so that it can make its prices competitive or go out of business. Proceeding on this premise, the industry already has watched the spectacle of several independent makers being unable to weather the depression's storm, and the opinion is widespread that the only thing which may prevent further casualties is a merger of companies which have been finding the going rather rough.

There is little doubt that the continuous strip mill now under construction by the Ford Motor Co. is being erected because of the higher cost of steel under the code. It is claimed that if steel prices stay near current levels, the capital outlay for this mill can be written off in a remarkably short time. When the new mill is completed, it is conservatively estimated that the Ford steel plant will be in a position to make 15,000 tons of bars and 30,000 tons of sheets a month. This means that well over 500,000 tons of steel a year will be lost to commercial mills.

Steel Tells Its Story

Of course, the steel industry has its side of the story to tell, too. Steel makers say that demand for automobiles can be stimulated directly by price cuts, because the product is being bought by the general public, but a price decline of even $10 a ton wouldn't add a pound to consumption of steel, which is not purchased by the public. The prize exhibit showing why steel prices should not go down is to put financial statements of steel companies alongside those of motor car manufacturers. Steel's profits are picayunish compared with those of General Motors and other automotive giants.

Costs of making steel under NRA have increased steadily. A sincere effort has been made to stamp out practices under the steel code which admittedly were inimical to the welfare of the industry. While automobile makers profited from these practices, they never should have been permitted in the first place.

As reported in this column last week, automobile companies are pleased at the downward turn taken by steel prices, but will not be satisfied until they are granted a base price at Detroit on bars and flat-rolled products. With considerable additional capacity being built in strip steel and sheets at Detroit, they believe the day is rapidly approaching when the automotive capital will become a basing point on all steel items made in this district.

Buick's model 40 has been well received by the public, promising to establish a permanent place for itself quickly. Buick's assemblies last month were 10,757 cars, the best month since December, 1931. In the first six months of 1934, Buick built 49,227 cars, compared with 26,708 in the same months of last year. The July production rate is 474 cars a day.

In the week ended June 30, Plymouth set an all-time peak in retail sales with a total of 9299 units. During the same week Dodge dealers sold 5280 Dodge and Plymouth passenger cars and 1067 Dodge trucks.

Published reports that automobile companies and body builders have placed orders for $20,000,000 to $30,000,000 worth of tool and die work for 1935 models is a gross exaggeration. Incidentally $20,000,000 probably will cover all the tooling expenditures of the entire industry for next year. Motor car makers have started in the last week to award tool and die business for coming models but most of the work thus far allotted has been for large body dies which take longer to make than other dies.

The majority of automobile companies have not yet begun to place their tool and die orders. Despite earlier predictions that much of the business would go to shops outside the state of Michigan, indications are that the bulk of the orders will stay in the Detroit district. Notable im-

provement in the local labor situation, the special equipment in local plants for handling tool and die work and the desirability of having as much of the work as possible done nearby, where supervision is easy and changes can be made with the least effort, are influences contributing to the distribution of the business largely in southern Michigan. A survey recently made shows that 75 per cent of the equipment for manufacture of large dies is in Michigan tool and die shops.

Briggs Mfg. Co. is understood to have been awarded a contract by Chrysler Corpn. for 1935 cars for stampings supplied for this year's models by an eastern company. Doors for certain Chrysler made cars are included in this contract. Chrysler Corpn., broke all records in the first half of 1934 with production of 388,742 cars, or 170,973 more than during the same period of last year. During the week ended July 7 the corporation's retail sales totaled 13,785 units, the second best week in its history.

General Motors' domestic retail sales last month were 112,847 units, or 17,594 more units than were sold in May. Chevrolet's domestic retail deliveries in June amounted to 88,483 units, the largest monthly total since May, 1931. World sales of the Ford Co. last month totaled 101,661 units, exceeding production by 3216 units. The remarkable records of the industry's three leading companies last month are traceable to price cuts instituted by General Motors and Chrysler at the beginning of June and by Ford in the middle of the month.

British Markets Quiet Pending Holiday Period—Tin Plate Agreement Progressing

LONDON, ENGLAND, July 10 (*By Cable*).—Pig iron is still quiet in view of approaching holidays. The coming weeks may see small surplus production and producers consequently are seeking export contracts. Home consumers are buying on a hand-to-mouth basis but prices may stiffen owing to higher raw material costs. Expansion is expected after the holidays.

Hematite consumption is steady and while new business is quiet, makers hold good order books.

Demand for semi-finished steel, particularly sheet bars, is quiet despite the decrease in Continental competition. Old contracts assure steady employment.

Structural steel is active but other departments are more quiet. Export demand still is improving.

Tin plate home and export demand is fair, but consumers generally are awaiting the outcome of international negotiations regarding which satisfactory progress was reported at the London meeting. Conferences are being continued at a meeting in Paris July 11.

Continental iron and steel is more quiet in view of approaching holidays. Semi-finished is fairly active and also steel bars, but other descriptions of finished steel are dull.

Considerable progress toward formation of a thin sheets cartel is reported, and in the meantime a new and more rigid temporary agreement has been concluded.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9
Billets, open-hrth.	£5 10s. to £5 15s.
Tin plate, per base box	17s. 3d. to 17s. 6d.
Steel bars, open-hearth	£7 17½s.
Beams, open-hrth.	£7 7½s.
Channels, open-hearth	£7 12½s.
Angles, open-hearth	£7 7½s.
Black sheets, No. 24 gage	£9 5s.
Galvanized sheets, No. 24 gage	£11 5s.

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

Billets, Thomas	£2 7s.
Wire rods, No. 5 B.W.G.	£4 10s.
Steel bars, merchant	£3 5s.
Sheet bars	£2 8s.
Plates, ¼ in. and up	£4
Plates, 3/16 in. and 5 mm.	£4 2s. 6d.
Sheets, ⅛ in.	£4 7s. 6d.
Beams, Thomas	£3 2s. 6d.
Angles (Basic)	£3 2s. 6d.
Hoops and strip base	£4 2s. 6d.
Wire, plain, No. 8	£5 7s. 6d.
Wire nails	£5 15s.
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.

Steel Corporation's June Shipments Were 32 Per Cent Above May Total

THE UNITED STATES STEEL CORPN. shipped 985,337 tons of steel products during June, an increase of 32.25 per cent over the 745,063 tons moved in the preceding month and the highest since May, 1930, when 1,203,916 tons was shipped. June shipments represented 61.2 per cent of the corporation's rated capacity for the 26 working days of the month.

In June, 1933, the movement amounted to 603,937 tons, engaging only 37.4 per cent of available producing capacity.

MONTHLY SHIPMENTS OF STEEL PRODUCTS BY UNITED STATES STEEL CORPN.

				1933		1934	
Month	1930	1931	1932	Shipments	Per Cent of Capacity	Shipments	Per Cent of Capacity
January	1,104,168	800,031	426,271	285,138	17.7	331,777	19.8
February	1,141,912	762,522	413,001	275,929	18.5	385,500	26.3
March	1,240,171	907,251	388,579	256,793	15.3	588,209	36.6
April	1,188,456	878,558	395,091	335,321	21.6	643,009	41.5
May	1,203,916	764,178	338,202	455,302	27.1	745,063	44.4
June	984,739	653,104	324,746	603,937	37.4	985,337	61.2
July	946,745	593,900	272,448	701,322	45.1	.....	...
August	947,402	573,372	291,688	668,155	39.8	.....	...
September	867,282	486,928	316,019	575,161	35.6	.....	...
October	784,648	476,032	310,007	572,897	35.5	.....	...
November	676,016	435,697	275,594	430,358	26.7	.....	...
December	579,098	351,211	227,576	600,639	38.7	.....	...
Plus yearly adjustment	(40,259)	(6,040)	(5,160)	(44,283)	...	.....	...
Total for year	11,624,294	7,676,744	3,974,062	5,805,235	30.1	.....	...

Steel Output Rises 30 Per Cent To 27 Per Cent of Capacity

Large Awards of Steel Piling and Structural Material Are Made—Automotive Prospects Good With Steel Buying Expected in August

ACCORDING to general expectations, public works projects and the automotive industry are proving to be the chief supports of the steel trade in the first normal week of the summer quarter. While steel producers are building up their own inventories in some instances, the consuming groups mentioned, together with the railroads, are largely responsible for an increase of six points, or nearly 30 per cent, in steel output this week, bringing the ingot production rate for the industry to 27 per cent of capacity.

Higher schedules are reported from all principal producing districts except the Birmingham and Wheeling areas, where declines of five points to 45 and 35 per cent respectively have taken place. Open-hearth plants at Detroit are still running at capacity and production at Chicago is unchanged at 28 per cent. Pittsburgh district output has risen eight points to 18 per cent; Philadelphia, three points, to 23 per cent; the Valleys, 18 points, to 28 per cent; Cleveland, 19 points, to 34 per cent, and Buffalo, five points, to 15 per cent.

THE legal division of the NRA has ruled that the filing with a code authority of a bid price in accordance with the Executive Order of June 29, referring to tenders to the Government or subdivision thereof, does not effect a change in the bidder's filed base prices. Any change in the filed minimum base prices must be made in accordance with the provisions of the code under which an industry is operating. This is in entire accordance with the opinions of steel producers who bid directly to the Government on very little tonnage and also believed that their contractual relations under the code would not be affected by the President's order.

THE effects of the Federal public works program are most noticeable in the West and Middle West. From 12,000 to 14,000 tons of sheet steel piling for the Fort Peck, Mont., dam has been divided between two producers. A bridge at Bettendorf, Iowa, calling for 4800 tons of structural steel and two bridges in Illinois which will take 2100 tons have been awarded. The Ford Motor Co. has placed 1400 tons for its strip mill building at River Rouge, Mich., bringing the week's structural lettings to 20,300 tons, compared with 10,550 tons in the previous week and only 8700 tons in the last week of June.

Even though new structural projects call for only 7500 tons this week, considerable additional public works tonnage is expected to come out as a result of recent allocation of Federal funds by the PWA. A large sum is expected to be set aside for the construction of locks to supplement dams now under construction in the Mississippi River. Additional equipment loans to the railroads may also be granted.

EARLY estimates of July automobile production are unusually favorable, output being estimated at as high as 280,000 units. Price reductions resulted in much heavier June sales than had been anticipated and automobile executives are hopeful that the present buying wave may extend into August. Initial steel purchases for 1935 models are expected by the middle of next month and spot orders for sheets, strip steel and bars from that source are an important factor in sustaining current steel mill schedules in the Detroit, Cleveland and Youngstown areas.

The results of recent steel price reductions, most of which become effective this week, are not yet discernible. Consumers who had laid in large stocks in the second quarter in anticipation of the considerably higher prices which were filed in April are extremely critical of the recent change, especially when inventories were built up with borrowed money. It is believed, however, that stocking of pig iron was heaviest, and no price revision is expected on this product. Sheet and strip inventories were also built up considerably, but quotations on these products still remain well above the purchasing levels.

AFFECTED by reduced quotations on bars, plates, shapes, sheets and hot-rolled strip, THE IRON AGE composite price for finished steel has declined to 2.131c. a lb. from 2.199c. a lb., where it had remained since April 24. At that time it was advanced $3.82 a ton from 2.008c. a lb. Lower prices filed since last week have been principally on relatively minor products which have been brought in line with more important kindred commodities.

Large rivets have been marked down $2 a ton to $2.90 a 100 lb., Pittsburgh or Cleveland. Electrical sheets are lower and reduced quotations will soon be effecive on rail steel bars, electrical sheets, alloy steel ingots, billets and slabs, cold-finished alloy steel bars and a number of other products. Reinforcing bars have been reduced $3 a ton at Pacific Coast ports to correct a local situation, but are not expected to be changed at other basing points.

THE IRON AGE pig iron composite price is unchanged at $17.90 a gross ton, but the scrap composite has declined to $10.58 a ton, the lowest level of the year. Scrap prices are generally weaker at Chicago and quotations in other districts tend toward softness.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	July 10, 1934	July 5, 1934	June 12, 1934	July 11, 1933
Per Gross Ton:				
No. 2 fdy., Philadelphia	$20.26	$20.26	$20.26	$16.34
No. 2, Valley furnace	18.50	18.50	18.50	15.50
No. 2 Southern, Cin'ti	19.13	19.13	19.13	16.51
No. 2, Birminghamt	14.50	14.50	14.50	12.00
No. 2 foundry, Chicago*	18.50	18.50	18.50	17.00
Basic, del'd eastern Pa.	19.76	19.76	19.76	16.09
Basic, Valley furnace	18.00	18.00	18.00	15.00
Valley Bessemer, del'd P'gh.	20.76	20.76	20.76	17.89
Malleable, Chicago*	18.50	18.50	18.50	17.00
Malleable, Valley	18.50	18.50	18.50	15.50
L. S. charcoal, Chicago	24.04	24.04	24.04	23.17
Ferromanganese, seab'd carlots	85.00	85.00	85.00	82.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.
*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$40.00
Light rails, Pittsburgh	35.00	35.00	35.00	30.00
Rerolling billets, Pittsburgh	27.00	29.00	29.00	26.00
Sheet bars, Pittsburgh	28.00	30.00	30.00	26.00
Slabs, Pittsburgh	27.00	29.00	29.00	26.00
Forging billets, Pittsburgh	34.00	34.00	34.00	31.00
Wire rods, Pittsburgh	38.00	38.00	38.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.60

Finished Steel

	Cents	Cents	Cents	Cents
Per Lb.:				
Bars, Pittsburgh	1.85	1.90	1.90	1.60
Bars, Chicago	1.85	1.95	1.95	1.70
Bars, Cleveland	1.85	1.95	1.95	1.65
Bars, New York	2.13	2.23	2.23	1.95
Plates, Pittsburgh	1.80	1.85	1.85	1.60
Plates, Chicago	1.85	1.90	1.90	1.70
Plates, New York	2.13	2.13	2.13	1.598
Structural shapes, P'gh	1.80	1.85	1.85	1.60
Structural shapes, Chicago	1.85	1.90	1.90	1.70
Structural shapes, New York	2.10¼	2.10¼	2.10¼	1.86775
Cold-finished bars, P'gh	2.10	2.10	2.10	1.70
Hot-rolled strips, P'gh	1.85	2.00	2.00	1.60
Cold-rolled strips, P'gh	2.60	2.80	2.80	2.25

Finished Steel

	July 10, 1934	July 5, 1934	June 12, 1934	July 11, 1933
Per Lb.:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.45	2.65	2.65	2.25
Hot-rolled annealed sheets, No. 24, Gary	2.55	2.75	2.75	2.35
Sheets, galv., No. 24, P'gh	3.10	3.25	3.25	2.85
Sheets, galv., No. 24 Gary	3.20	3.35	3.35	2.95
Hot-rolled sheets, No. 10, P'gh	1.85	2.00	2.00	1.65
Hot-rolled sheets No. 10, Gary	1.95	2.10	2.10	1.75
Wire nails, Pittsburgh	2.60	2.60	2.60	2.10
Wire nails, Chicago dist. mill	2.65	2.65	2.65	2.15
Plain wire, Pittsburgh	2.30	2.30	2.30	2.10
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.15
Barbed wire, galv., Pittsburgh	3.00	3.00	3.00	2.60
Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	2.65
Tin plate, 100 lb. box, P'gh.	$5.25	$5.25	$5.25	$4.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh.	$11.75	$11.75	$11.75	$12.12½
Heavy melting steel, Phila.	10.50	10.50	10.50	10.25
Heavy melting steel, Ch'go.	9.50	9.75	9.75	10.25
Carwheels, Chicago	9.50	9.75	9.75	9.50
Carwheels, Philadelphia	12.50	12.50	12.50	12.25
No. 1 cast, Pittsburgh	12.25	12.25	12.25	10.50
No. 1 cast, Philadelphia	11.50	12.25	12.25	12.25
No. 1 cast, Ch'go (net ton)	7.25	7.50	7.50	10.50
No. 1 RR. wrot., Phila.	11.25	12.25	12.25	10.75
No. 1 RR. wrot., Ch'go (net)	7.25	7.50	7.50	6.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.85	$3.85	$3.85	$2.25
Foundry coke, prompt	4.60	4.60	4.60	3.00

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery‡	8.75	8.75	8.75	8.75
Lake copper, New York‡	9.12½	9.12½	9.12½	9.00
Tin (Straits), New York	51.87½	51.37½	51.25	46.00
Zinc, East St. Louis	4.35	4.35	4.25	4.85
Zinc, New York	4.70	4.70	4.60	5.22
Lead, St. Louis	3.60	3.60	3.85	4.35
Lead, New York	3.75	3.75	4.00	4.50
Antimony (Asiatic), N. Y.	7.75	7.75	7.90	6.75

On export business there are frequent variations from the above prices. Also, in domestic business, there is at time a range of prices on various products, as shown in our detailed price tables. ‡Blue Eagle copper.

▲ ▲ ▲

▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
July 10, 1934	2.131c. a Lb.	$17.90 a Gross Ton	$10.58 a Gross Ton
One week ago	2.199c.	17.90	10.67
One month ago	2.199c.	17.90	10.67
One year ago	1.953c.	15.17	10.88
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low	High	Low	High	Low
1934	2.199c., April 24	2.008c., Jan. 2	$17.90, May 1	$16.90, Jan. 27	$13.00, Mar. 13	$10.58, July 10
1933	2.015c., Oct. 3	1.867c., April 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Steel Production Nearly Doubled at Pittsburgh

Output Rises to 18 Per Cent While Valley Operations Jump to 28 Per Cent—Wheeling Production Declines

PITTSBURGH, July 10.—A moderate rebound from the low levels of last week has occurred in ingot output. In the Pittsburgh district operations are eight points higher at 18 per cent, while in the Valleys and nearby northern Ohio production is up 18 points to 28 per cent. In the Wheeling district output is slightly lower at 35 per cent. Open-hearths are being added very slowly, and no further sharp upswing in output is likely this month.

Finishing mills are considerably more active. The tin plate group leads with schedules averaging 50 per cent of capacity. Sheet and strip mills are operating somewhat intermittently at 20 to 25 per cent. Some mills remain closed and will not resume until accumulation of orders warrants renewal of operations.

Third quarter tonnage is dribbling in very slowly. The recent unsettlement and adjustment of prices to lower levels have not stimulated consumer interest. What little tonnage is being placed represents spot requirements. The chief hope for steel tonnage this month is pinned on the automotive industry, but thus far orders from that quarter have not been spectacular. Structural steel and reinforcing bar producers continue to rely mainly on public works construction, which in this district is expected to pick up in the near uture by virtue of PWA appropriations of $24,500,000. Some bridge work is proposed in the program. The construction field is otherwise drab.

Large rivets have been reduced $2 a ton to $2.90 a 100 lb., Pittsburgh. Under code authority of western Pennsylvania some reductions in coke are now permissible, the principal concession being a 35c. a ton discount on run-of-oven coke on track for a period of 90 days or more. Other raw materials are inactive.

Pig Iron

Producers in this district do not expect to follow the precedent set by steel makers in reducing prices. The advances in second quarter averaged only $1 a ton and barely cover the additional costs of raw materials and labor. Consumer melt is at an extremely low point, and new business is practically nil. Backlogs are virtually exhausted, and the Sharpsville, Pa., furnace was banked last week for an indefinite period. Two large consumers are expected to enter the market soon for third quarter requirements.

Semi-Finished Steel

Effective July 10 sheet bars will be established at $28, and billets, blooms and slabs at $27, Pittsburgh and Youngstown, representing a $2 a ton reduction from the former bases. Alloy billets, slabs and ingots will be reduced $2 a ton on July 12 to $49, Pittsburgh. Skelp and wire rods remain unchanged. Some non-integrated mills are taking moderate shipments in order to build up depleted stocks.

Rails and Track Accessories

With the exception of general quarterly requirements, carriers are displaying little interest in these products. Major steel rail requirements are practically covered for the time being, and companion fastenings are sympathetically inactive.

Bars

Effective July 10, soft steel merchant bars will be established at 1.80c. a lb., Pittsburgh, a reduction of $2 a ton. Alloy steel bars will be reduced $2 a ton on July 13 to 2.45c., Pittsburgh. Bookings of merchant bars since July 1 have been very meager, with a very gradual pickup predicted for the remainder of the month. The chief hope in the immediate outlook is the automotive industry.

Cold-Finished Bars

Cold-finished alloy steel bars are being reduced $2 a ton to 2.95c. a lb., Pittsburgh, establishing the price at the same base which applied early in second quarter. No change has been indicated in the price of cold-finished carbon bars, nor is any revision contemplated at this time. Third quarter tonnage is thus far very disappointing, with no consuming quarter offering notable activity. The major prospect for tonnage this month is the motor car industry, with some moderate bookings expected from miscellaneous consuming lines. Demand from agricultural implement manufacturers is seasonally low, and is also depressed by drought conditions which are now being reflected in farm purchasing power.

Reinforcing Bars

Although forward prospects for tonnage are brighter, current lettings are few. In the immediate district, proposed PWA construction work will undoubtedly afford a substantial outlet for reinforcing steel. At the moment there is little talk of a revision in the current base price of 2.05c., Pittsburgh, for straight lengths quoted by distributers. Most producers are disregarding the Presidential order permitting 15 per cent price reductions in bids on Federal, State or municipal work.

Plates and Shapes

Effective July 10 plates and shapes will be established at the reduced basis of 1.80c., Pittsburgh. Very few contracts had been taken at the high second quarter quotation of 1.85c. Plate consumption continues at a very low level, with new interest practically limited to barge repair work, railroad maintenance and scattered tank projects. About 640 tons of fabricated plate will be furnished by McClintic-Marshall Corpn. for 44 steel pontoons for the United States Engineer Office at Vicksburg, Miss.

Structural awards are virtually featureless, being restricted largely to highway bridge construction over a wide front. Bids have been readvertised for the West 205th Street viaduct in New York.

Tubular Products

No revision in present pipe discount cards are expected. Pittsburgh district mills are resuming operations this week on moderate bases, and will run largely against production orders. Some new business, however, has dribbled in since July 1, with demand for oil country goods leading. Standard pipe is also showing some life. Forward prospects for the latter grade are brightened particularly by proposed Government housing program. Locomotive boiler tubes and mechanical tubing are very dull.

Wire Products

With no immediate revisions in prices expected, wire products are now uniformly established at the adadvanced schedules announced in second quarter. Most mills in this district are resuming operating schedules on a limited scale this week and next week. Third quarter contracting has naturally been restricted in view of the heavy protective buying that occurred in second quarter at lower prices.

Sheets

All grades of sheets are now established at the lower bases. Consumer reaction to the reduction has not thus far been clearly established. Although there is no definite means of gaging

consumer stocks, it is believed that second quarter purchases in anticipation of the substantial nominal price advances have padded inventories considerably. Some liquidation is therefore believed essential before buying picks up on a broad scale. Restricted operations are generally in force this week, with the average for the sheet mill group estimated at 20 to 25 per cent.

Tin Plate

The tin plate industry this week is operating at about 50 per cent of capacity after a holiday week of general idleness. It is doubtful, however, if the current rate will be maintained very long. Despite the fact that tin plate consumption is nearing the season's peak, and encouraging reports of prospective tomato, corn and late pea crops, it is believed that most large consumers bought to the limit during first half, and will now begin to liquidate stocks before assuming further commitments.

Strip Steel

On July 7 hot-rolled strip was established at 1.85c., and cold-ro led strip at 2.60c., Pittsburgh, representing reductions of $2 and $4 a ton. The new prices have not yet proved inviting to consumers. A sharp pickup in strip mill operations this week is expected, although the improvement may be short-lived. Few mills can boast of good backlogs, and rolling schedules for the month will likely be sporadic.

Bolts, Nuts and Rivets

The leading Cleveland producer of rivets has marked down the price of large rivets $2 a ton to $2.90 a 100 lb., Pittsburgh; $3, Chicago, and $3.05, Birmingham. Producers in the Pittsburgh district will likely revise their schedules accordingly. Bolt and nut discounts are unchanged. Activity is seasonally depressed, although a fair amount of third quarter tonnage is on producers' books.

Coal and Coke

Effective July 6, under code authority of Western Pennsylvania subdivision of division No. 1, spot sales of domestic coke only to retail dealers for shipment through July 31 may be made at 20c. a net ton under the listed prices, except for shipment into Canada, Pittsburgh, Erie, Easton and central New York State, New York and Boston. A special price of $3.35 will apply to those destinations for all sizes above 1 in., and $2.60 for range coke. A discount of 20c. a ton off list prices will apply to shipments of all grades of coke other than domestic and premium foundry coke to northern Pennsylvania and New York State. Effective July 6 run-of-oven coke, under load in railroad equipment for a period of 90 days or more, may be sold at an additional discount of 35c. a net ton off list price upon filing with the code authority a certified statement of car numbers and dates loaded.

Scrap

The only index of the current market for No. 1 heavy melting steel is the disposal of that grade on the current Baltimore & Ohio list at around $12. The market is thus quotably unchanged at $11.50 to $12, with very little, if any, tonnage moving. Some scattered lots have been placed in the last 10 days, but have not been significant from a tonnage standpoint. Suspensions to some Pittsburgh mills are still in effect, and shipments are not expected to make much headway this month. Fill-in buying will likely characterize early trading.

Buffalo Furnace Operations Lower

BUFFALO, July 10.—The Lackawanna plant of the Bethlehem Steel Co. has reduced its blast furnace operation from three to one. Pig iron business is very slow with no inquiries and only a few small lots of iron moving. Foundries are buying only as they actually require material.

Mill operations have declined since the first of the month to a very low level. Lackawanna opened Sunday night with three open-hearths, the first operation since July 1. Republic Steel Corpn. and Wickwire-Spencer Steel Corpn. are operating at reduced schedules.

The market for scrap is dull with only very minor transactions. A sale of 500 tons of low phos is reported at $13, Buffalo district. The price at Buffalo is about $12.

General Motors Car Sales Increase

JUNE sales of General Motors cars to consumers in the United States totaled 112,847 compared with 95,253 in May. Sales in June a year ago were 101,827. Sales for the first six months of 1934 totaled 494,972 as compared with 399,764 in the corresponding six months of 1933.

Sales of General Motors cars to dealers in the United States in June totaled 118,789 as against 103,844 in May. Sales in June a year ago were 99,956. Sales for the first six months of 1934 totaled 592,867 compared with 427,762 in the corresponding six months of 1933.

June sales of General Motors cars to dealers in the United States and Canada, together with overseas shipments, totaled 146,881 as against 132,837 in May. Sales in June a year ago were 113,701. Sales for the first six months of 1934 totaled 750,276 as compared with 498,622 in the same six months of 1933.

Pipe Lines

Northern Natural Gas Co., Minneapolis, plans welded steel pipe line to St. Peter, Minn., for commercial natural gas supply, and steel pipe line distribution system. Cost about $75,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 20 for steel pipe and steel tubing; also for iron pipe (Schedule 2840) for Eastern and Western Navy Yards.

Canton, Miss., has engaged Black & Veatch, Mutual Building, Kansas City, Mo., consulting engineers, to draw plans for welded steel pipe line to natural gas properties in Jackson County for municipal gas supply, and for steel pipe line distribution system. Fund of $160,000 is available.

Gas Division, Delaware Power & Light Co., Wilmington, Del., will install steel pipe line for gas supply on Washington Boulevard, Brandywine Hills district.

Purchasing Officer, Indian Warehouse, 1749 West Pershing Road, Chicago, asks bids until July 19 for requirements of welded steel pipe for fiscal year 1935 (Schedule 17).

International Pipe Line Co., Helena, Mont., subsidiary of Texas Co., New York, has awarded contract to Roger C. Moore, Shelby, Mont., for welded steel pipe line from oilfield district at Cutbank, Mont., to oil refinery of parent organization at Sunburst, Mont. Cost about $150,000.

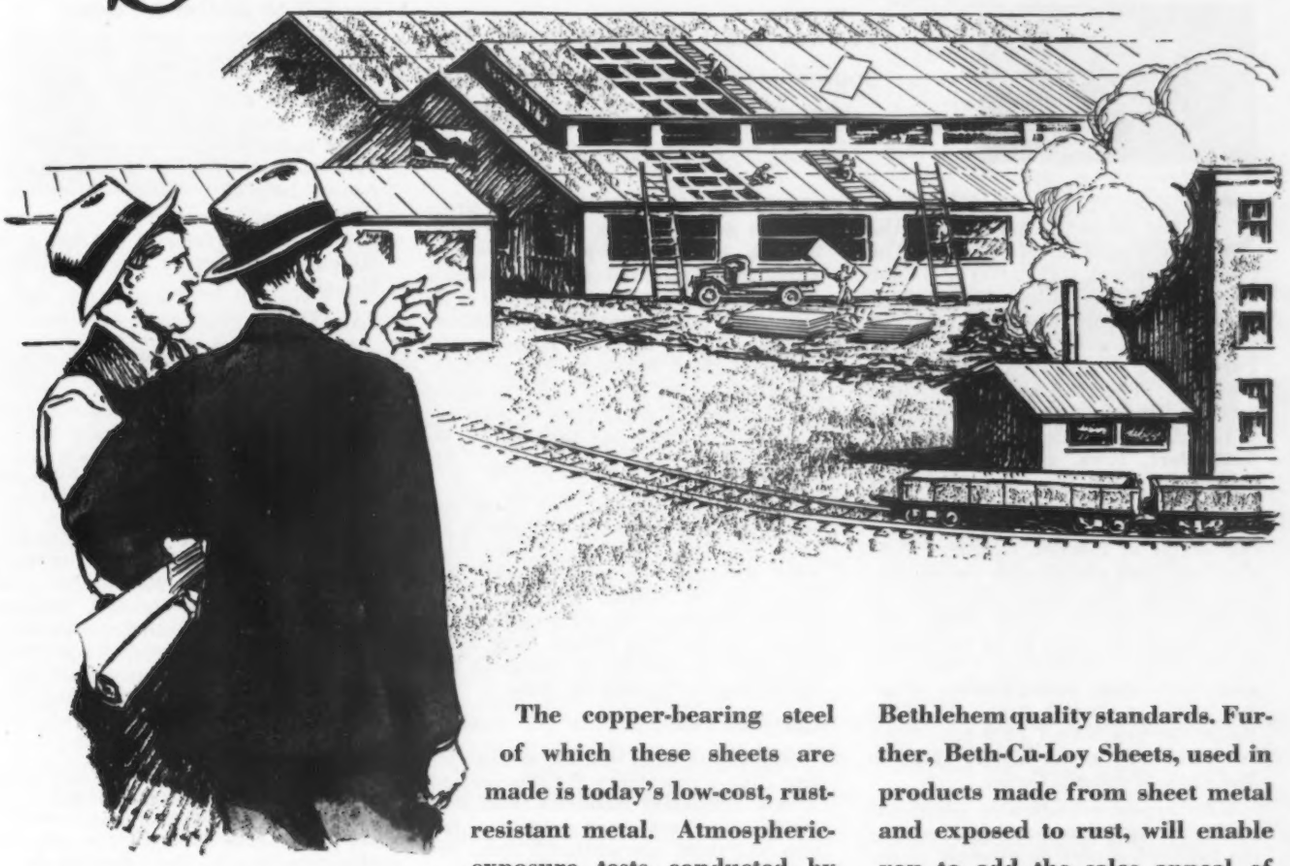
Houston, Tex., plans extensions and improvements in steel pipe system for gas distribution in Magnolia Park district, including line replacements. Fund of $92,000 has been arranged.

Shrink Fits Using Dry Ice

SLIP or shrink fits made by cooling by means of dry ice were discussed by W. H. Swanger, National Bureau of Standards, before the American Society for Testing Materials. Pins 1 in. in diameter were cooled to -80 C. (-112 deg. F.) in the dry ice and inserted into rings which were about 0.0015 in. smaller than the pins when both were at room temperature.

Three combinations of pin and ring were used; a brass pin and brass ring; a brass pin and steel ring; and a steel pin and steel ring. The maximum resistance to axial slip developed after a small amount of initial slip was 1430 lb. per sq. in. of contact area in the all-brass unit and 6050 lb. per sq. in. of contact area in the all-steel unit. The higher resistance in the steel unit was due chiefly to the fact that seizing between pin and ring occurred to such an extent that particles of steel were torn bodily from the pin. In the brass unit no such seizing occurred. The maximum resistance developed between the steel ring and brass pin was 2,199 lb. per sq. in. of contact area, and the pin was visibly scored by the steel ring.

Solve this Rust Problem



IN the many applications of sheet metal around the industrial plant, such as ventilators, chutes and roofing, annual losses due to rust may mount up importantly. This is one problem that the executive no longer has to seriously concern himself about; a problem to which there is a clean-cut, decisive solution:

Use Beth-Cu-Loy Sheets for all sheet-metal work exposed to weather or to moist air.

The copper-bearing steel of which these sheets are made is today's low-cost, rust-resistant metal. Atmospheric-exposure tests conducted by the American Society for Testing Materials revealed that copper-bearing steel ranks first in rust-resistance among the whole range of commercial steels and irons. Yet the added cost of Beth-Cu-Loy copper-bearing Sheets is negligible.

For all sheet-metal applications about the plant use Beth-Cu-Loy, the low-cost, rust-resistant Sheets, manufactured from ore to finished product by Bethlehem, to Bethlehem quality standards. Further, Beth-Cu-Loy Sheets, used in products made from sheet metal and exposed to rust, will enable you to add the sales appeal of durability, at hardly any additional cost.

Beth-Cu-Loy is but one of the many types of Bethlehem Sheets, which include, in addition to a full range of galvanized, flat and formed sheets, hot-rolled, hot-rolled annealed, cold-rolled, blue-annealed, and special-finish sheets, and furniture and automobile sheets. Bethlehem can supply virtually any sheet you require, for any purpose.

BETH-CU-LOY SHEETS

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. *District Offices:* Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Indianapolis, Milwaukee, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul, Washington, Wilkes-Barre, York. *Pacific Coast Distributor:* Pacific Coast Steel Corporation, San Francisco, Seattle, Los Angeles, Portland, Honolulu. *Export Distributor:* Bethlehem Steel Export Corporation, New York.

BETHLEHEM STEEL

Public Works Projects Take 20,000 Tons at Chicago

Further Steel Tonnage from This Source in Sight—Production Holds at 28 Per Cent for Second Week

CHICAGO, July 10.—Awards of public projects loom large in the week's news in this district. The general contract for 12,000 to 14,000 tons of sheet steel piling for the Fort Peck, Mont., dam has been awarded to Frazier, Davis & Co. and G. L. Tarlton, St. Louis, who submitted a joint bid. The steel has been divided between Illinois Steel Co. and Jones & Laughlin Steel Corpn. Bridges at Bettendorf, Iowa, and Lemont, Ill., calling for 4800 tons and 1000 tons respectively have been awarded to the McClintic-Marshall Corpn., and a second bridge at Lemont, requiring 1100 tons, has been placed with the Mississippi Valley Structural Steel Co. A bridge at Sault Ste. Marie, Mich., taking 775 tons, has been let to the Lackawanna Steel Construction Corpn. In addition to these public awards, totaling close to 20,000 tons, the Ford Motor Co. has placed 1400 tons for a hot strip mill at its Rouge plant to McClintic-Marshall Corpn.

Mills expect considerable additional public works tonnage to come out in the fall and winter as a result of the latest grant of Federal funds to the Public Works Administration. The setting aside of a large sum for the construction of dams to supplement locks now being completed on the Mississippi River seems assured. Public money may also be used for further railroad purchases, although some carriers, disturbed by prospective losses in revenue in the drought-stricken area, are reluctant to increase their indebtedness to the Government. Tractor, truck and implement makers are due to suffer losses in business as a result of the poor yields of small grains, but have derived encouragement of late from the improvement in the corn crop which has followed recent rains. The automobile trade holds up remarkably well for the season.

Steel ingot output in this district is unchanged at 28 per cent of capacity, a gain by one interest having been offset by losses of others. Mill production, however, has shown a steady pick-up since the almost complete suspension on the Fourth of July. Another steel works blast furnace has been banked, reducing the number of active stacks in the district to 11, of which two are merchant producers.

The local steel trade takes the view that the President's order of June 29 authorizing bidders on public projects to make tenders of 15 per cent or less below code prices does not apply to the steel industry. Each mill has a private contract with the code authority which prohibits price reductions unless they are made openly with 10 days' notice to competitors. Violation makes a mill liable to liquidated damages regardless of any action the President may take, it is said.

Pig Iron

Demand is light, as was to be expected after the heavy shipments in May and June. Two merchant furnaces remain in operation in this district, but a Toledo stack may be banked shortly. Foundry coke shipments to date this month have more than kept abreast of deliveries in the corresponding period of June.

Cast Iron Pipe

Demand is fair, but not in the volume that is customary for this season. A few additional moderate-sized municipal tonnages have come up for bids and there are scattered small inquiries for sewage disposal and filter plants. The most encouraging development in the market is a revival of interest on the part of private buyers. An automotive interest is inquiring for a large tonnage, and a utility which has not purchased for several years is talking of buying pipe.

Reinforcing Bars

The superstructure for a Mississippi River bridge at Bettendorf, Iowa, on which general contract bids were taken last week, will call for 400 tons of bars, while new Illinois State bridge work on which figures were taken July 3 will take about 100 tons. The volume of new tonnage in this territory is tapering off. Prices remain unchanged.

Plates

Plates and shapes were less influenced by speculative influences than most other rolled products because material for identified projects does not come under the calendar quarter restrictions covering contracts under the Code. A new resolution of the code authority now places railroad purchases of material for car repairs in the identified project classification. No new railroad programs are being launched but it is intimated that the Government may urge certain lines to borrow Federal funds for additional work. A large tonnage of plates and shapes will be required for Mississippi River dams to be built to supplement locks now being completed. It is reported that $125,000,000 will be allotted for dams.

Rail Steel

Prices of rail steel bars have been reduced $2 a ton to 1.75c. a lb., Chicago or Gary, effective July 15. Hot-rolled rail steel strip has been reduced $1 a ton to 1.75c., Chicago, also effective July 15.

Rail steel bars and hot-rolled rail strip have been reduced to 1.75c. a lb., Moline Mill, or 1.775c. delivered Moline.

Axle Shapes

Prices of axle commercial shapes (bar size) have been reduced to 1.80c., Chicago.

Structural Material

Structural awards of the week are heavy because of the placing of several large individual tonnages. The superstructure for the Bettendorf, Iowa, bridge, 4800 tons, a hot strip mill for the Ford Motor Co., 1400 tons, and a State bridge, Lamont, Ill., 1000 tons, have all been awarded to the McClintic-Marshall Corpn., New inquiries are light, but considerable new work is due to be undertaken under the latest grant to the PWA.

Bars

New business is still light, but gradual improvement is looked for from now on. Speculative purchases of bars are believed to have been much less extensive than in flat-rolled products. Some sellers believe that consumers will soon find that their speculative tonnage is requirement tonnage. The drought has adversely affected production of tractors and trucks and farm equipment manufacture is in its seasonal dull period. Automobile production is holding up better than had been expected and miscellaneous lines are still fairly active for the season.

Sheets

Production has been resumed at a low rate after shutdowns last week. New buying has been limited and betterment will undoubtedly be slow.

Wire Products

Mill operations have picked up since a week ago and now range from 30 to 35 per cent of capacity. Demand from the automotive trade is well maintained, but the call for material from jobbers and miscellaneous manufacturers is disappointing. There continues to be a fair demand for wire cable from the oil producing areas. Utilities are showing no interest in electrical wire. Prices are unchanged.

Rail and Track Supplies

Rail mills continue to operate at an average rate of 40 per cent of ca-

(Concluded on Page 62)

Cleveland-Lorain District Output up to 34 Per Cent

Production Still 20 Points Below Rate at End of June — Rivet Prices Reduced $2 a Ton—Other Products Marked Down

CLEVELAND, July 10. — Ingot output in the Cleveland-Lorain territory moved up this week to 34 per cent of capacity after the holiday week shutdown which brought the rate down to 15 per cent. The present rate is 20 points below that during the last week of June. The Otis Steel plant which was shut down for 10 days resumed Monday with four open-hearths and the Corrigan, McKinney and Lorain plants are each operating six furnaces.

A little new business in sheets and strip steel came from Michigan automobile plants during the week but with that exception very little new tonnage of finished steel was placed, and mills are badly in need of orders. As most consumers have large stocks, prospects of much improvement in demand for several weeks are not promising.

Although under the revised code there is apparently not much incentive for making contracts several mills are actively soliciting commitments for the quarter and many consumers, particularly of bars, plates and shapes, have placed contracts at the new prices. The principal advantage of contracts evidently is that they give a consumer better assurance of deliveries should mills be rushed with orders at the end of the quarter. Contracts closed prior to the price reductions have been revised.

Several additional price revisions have been announced. Electrical sheets have been marked down $3 a ton and fender and lamp stock $1 to $4 a ton from the prices that had been announced for the third quarter. Prices on large rivets have been reduced $2 a ton from those announced for the current quarter. Local warehouse prices have been lowered. No change is expected on wire products.

Pig Iron

Occasional sales of one or two car lots are being made and some of this business is from foundries that allowed part of their second quarter tonnage to lapse, although it was contracted for at $1 a ton below the present $18.50 price. With good stocks in furnace yards business for the next few weeks is expected to be light. Some of the automobile as well as jobbing foundries have curtailed operations.

Sheets

A little new business has come from the motor car industry at the new prices enabling the local producer to keep its finishing mills in operation part of this week. There is virtually no new demand from consumers in this territory who have good stocks and many are complaining because of the price reduction after they had taken in these stocks in expectation that the previously announced third quarter prices would be maintained. With the announcement of a $3 a ton reduction on electrical sheets effective July 17 all sheet prices have been reduced. New quotations on electrical sheets are field grade 2.90c.; armature grade 3.25c.; electrical grade 3.75c.; special motor grade 4.80c. and special dynamo grade 5.50c.

Strip Steel

Fender stock has been reduced effective July 12 to 3.15c., Cleveland and Pittsburgh, for 16-gage and heavier and to 3.30c. for 17-gage and lighter. The new prices are $1 to $4 a ton respectively lower than the withdrawn third quarter prices. The market is now established at 1.85c., Pittsburgh, for hot-rolled strip and 2.60c., for cold-rolled material. The automotive industry has placed a little tonnage at the new prices and a few small lot orders have come from consumers in this territory.

Bolts, Nuts and Rivets

The Champion Rivet Co., Cleveland, Monday reduced the price of large rivets $2 a ton to $2.90 a 100 lb., Cleveland and Pittsburgh, $3, Chicago, and $3.05 Birmingham. This is an advance of $3 a ton over the second quarter price. A $5 advance from the last quarter price had been announced and some contracts have been closed at that advance but they will be revised. The reduction in the steel bar price led to the revision in rivet prices. Other manufacturers are expected to make the reduction. Small rivets are unchanged. The rivet industry is not operating under a code. Bolts and nuts are quiet.

Warehouse Business

Local warehouses have reduced prices $1 to $4 a ton on bars, plates, shapes, sheets and strip, the reductions corresponding with the revision in mill prices.

Bars, Plates and Shapes

The only sizable structural award is 1460 tons for the strip mill building for the Ford Motor Co. and there is virtually no new inquiry. The Wheeling & Lake Erie Railroad has placed 1200 tons of bars, plates and shapes for car repair work. The Cleveland Council yesterday accepted the terms of a PWA loan for its sewage disposal works, extensions to which were held up several months. This will release 2500 tons of reinforcing bars and require the purchase of 1000 tons of plates and shapes. The former 2.60c., delivered Detroit, price for alloy bars has been restored, a reduction of $2 a ton from the recent price.

Old Material

The market is lifeless and prices to consumers are untested. Mills still have good stocks. However, their contracts are about cleaned up and some are expected to come in the market within 30 days. Dealers are talking of higher prices but local consumers at present probably would resist paying over $9.50 for heavy melting steel, although some of the dealers claim to be paying that price for yard stocks and that price is not bringing out much scrap.

New England Market Remains Very Quiet

BOSTON, July 10.—Business in pig iron, scrap and steel mill products is still quiet with every indication of remaining so during July at least. New England foundries generally have sufficient iron on hand to last this month or longer because the melt is decreasing rather than increasing. Excessive heat has necessitated suspension of operations at numerous foundries, thus adding to the dwindling melt. Pig iron sales the past week did not approximate 600 tons.

Scrap

The Boston Iron & Metal Co., Baltimore, has purchased the Eastern Steamship Lines steamers Calvin Austin and Governor Dingley and will scrap them. Jacob Ziskind, Fall River, Mass., has purchased the textile machinery of the Russell Mills, Pittsfield, Mass., and will scrap part of it. A steamer has been chartered by a Chelsea, Mass., dealer to load 2500 tons of No. 1 and No. 2 steel this month for export to Japan, part of a 5000-ton lot purchased about two months ago. The scrap market otherwise has been so lifeless the past week prices had no opportunity to change.

Structural Steel Inquiries Feature New York Market

New Business Very Light as Sellers Await Effective Dates of New Prices—Reduced Quotations Not Being Made on Federal Jobs

NEW YORK, July 10.—Business has been unusually quiet during the last week as mills have had to suspend shipments until the new prices become effective. A few exceptions have occurred when consumers have been badly in need of steel and were unable to wait to take advantage of the lower prices. Under the terms of the code producers have been forced to adhere strictly to the effective dates of the lower prices but little tonnage has been affected in that way. A few orders have been booked for shipment at the new prices this week, but forward tonnage is of little consequence.

Public works projects constitute the bulk of current business. Bids will be taken this week on a viaduct at 205th Street, New York, which will require 1100 tons of shapes. The New York Central is expected to inquire before the end of the month for steel needed to complete its West Side improvements in Manhattan. About 3000 tons of structural steel is yet to be bought. No other railroad business is before the trade with the exception of the Board of Transportation inquiry for the completion of the municipal subway. Public works allotments in the metropolitan district recently announced call for expenditures of more than $8,000,000, but most of the projects are small and the steel tonnages involved will not be large. The William Kennedy Construction Co., New York, is low bidder on the general contract for pier shed No. 88 on the North River, requiring 3000 tons of structural steel, while the George F. Driscoll Co. is low bidder on pier sheds Nos. 90 and 92, which will take 6000 tons.

No price reductions have been filed on tin plate, pipe or wire products, and as the new schedules become effective on most other lines this week no further reductions are expected. In most cases the lower quotations do not appear to be attracting any additional tonnage and consumers who had stocked up heavily in advance of the sharp increases which were to have become effective July 1 are by no means pleased with the recent changes. It is pointed out that the increases over the second quarter shipping prices are not now sufficient to have warranted the borrowing of money to lay in stocks which a number of consumers did.

In bidding on Federal, State and municipal projects in this district steel companies have ignored the recent Presidential order permitting price reductions up to 15 per cent. A strict legal interpretation of the order indicates that prices used on this sort of work need not necessarily be extended to the trade in general, but steel companies do little contract bidding and believe that the code should not be violated by making lower quotations to distributers.

Pig Iron

Last week's market was extremely listless and sellers booked less than 450 tons of prompt and third quarter iron, as compared with 950 tons in the preceding week and 1200 tons sold two weeks earlier. The consensus is that pig iron quotations will not decline in sympathy with finished steel price reductions. However, no increase is possible until the fourth quarter and melters, therefore, perceive no inducement to purchase until their current heavy yard stocks are reduced to a more normal level.

Reinforcing Steel

Some consumers are withholding orders in the hope that prices may be revised downward. However, no mill has indicated any intention of filing lower quotations, and at the present time a change is considered unlikely. Some distributers have heretofore avoided the $2 a ton cutting charge by buying random lengths or definite lengths with not over 10 per cent shorts. This provision has now been extended to apply to all consumers. However most users do not care to purchase other than definite lengths. The market in this territory was inactive last week, but several pending projects should be placed within the next fortnight. Bids are in for 600 tons for pier sheds on the North River, New York, and a Jamestown, N. Y., high school, requiring 200 tons, is expected to be let next week.

Scrap

The inventories of eastern Pennsylvania mills are judged to be quite low, but no melter has yet signified an intention to purchase against future requirements. Naturally this is reflected in an uncertain undertone in this buying market, but local brokers are apparently unconcerned and insist that no price reductions will be made. Foreign buyers are following the cue of domestic mills and are delaying many projected commitments. However, most exports have backlogs calling for shipments through August and are not anxious to consider new business further ahead. Current scrap purchases from dealers are mostly for delivery to Japanese and Italian melters, and it is estimated that total 1934 shipments to these countries will well exceed 1,200,000 and 300,000 tons respectively. This steady flow of material abroad is the major factor in preventing price weakness in the East. Therefore higher quotations are in prospect when domestic mills start purchasing, as foreign mills will probably follow them into the market.

No Activity In St. Louis Market

ST. LOUIS, July 10.—The market for finished iron and steel is exceedingly quiet. Few inquiries are before the trade, and not much buying is expected during the remainder of July, as nearly all factors made purchases of as large tonnages as possible for shipment during second quarter. It is understood that virtually all contracts were cleaned up during the quarter.

Scrap iron prices continue nominally unchanged, and the market is at a standstill. There is very little buying, and only a small quantity is being offered. Dealers look for a quiet July, but believe there may be some buying in August.

The melt of pig iron in the St. Louis district dropped during the last week as the Independence Day holiday and the extreme heat made operations difficult. Also the stove industry is slowing down, after a rush to complete orders placed before the advances in wages and materials. Sales of pig iron are light.

Pennsylvania Orders 1000 Underframes

THE Pennsylvania Railroad has accepted delivery of 500 cast steel underframes made by the General Steel Castings Corpn., Eddystone, Pa. Also it has announced that 1000 additional underframes for 70-ton flat cars will be made over the remainder of the year for delivery to various Pennsylvania shops. These underframes are cast complete in one piece and only require setting on trucks and the addition of brake and coupling equipment before being put in service.

Eastern Pennsylvania Output Rises to 22 Per Cent Level

Orders for Plates, Sheets and Billets Continue in Fair Volume—Warehouse Prices Reduced—Scrap Prices Lower

PHILADELPHIA, July 10.—Third quarter bookings at the new reduced price levels are extremely light in this district except in several instances when orders have been received in fair volume. In the latter case they covered plates, sheets and billets and if sustained would call for operations of 35 to 46 per cent. On the whole, however, the market is unusually dull and most producers do not look for a substantial pick-up before the middle of next month. Consumers are pretty well covered for immediate requirements and are cautious in making further commitments.

The reduced levels 1.90c., Coatesville, Pa., and Sparrows Point, Md., on plates, and 1.90c., Bethlehem, Pa., on structural shapes become effective on July 12. On the same date the steel bar price at Buffalo will be reduced to 1.90c. Reductions on sheets went into effect July 7. Following the lead of mill price reductions, warehouses have reduced levels, ranging from $1 to $5 on finished steel, effective July 5. The scrap market has weakened and prices on several grades are down 50c. to $1 per ton.

Open-hearth operations are up three points to 22 per cent of capacity following the fourth of July holiday period, along with completion of second quarter shipments, when there was widespread closing down of furnaces. There was a net gain of three active furnaces this week over last week, but two of them will soon be taken off for repairs. Mills are piling small stocks of ingots, semi-finished and finished steel. One producer, which has taken off one open-hearth furnace, today put its small structural mill on double turn.

Pig Iron

New orders range from 50 to 300 tons, the market being generally dull. Stove makers are fairly busy and are taking shipments. Stocks in the hands of melters are reported to be relatively small, with few exceptions. Prices remain unchanged.

Plates, Shapes and Bars

Some makers report fair sized orders for both plates and shapes, though generally the market is dragging. Demand for merchant steel bars is dull. Fair sized specifications against old contracts for shapes for identified structures continue to be made. No change has been made in the reinforcing bar price.

Sheets

Small lots of sheet tonnage for third quarter shipment are being booked. They come from miscellaneous sources, including stove and radio manufacturers. Purchases of automotive sheets are light but mills look for an early improvement in this line since reductions were made in car prices. It is understood that orders for two trains to be made of stainless steel have been placed in this district and that another likely will be placed soon.

Imports

The following iron and steel imports were received here last week: 4830 tons of chrome ore from French Oceania; 202 tons of pig iron from British India; 100 tons of ferromanganese from Poland; 25 tons of manganese ore from Egypt, and 11 tons of cold-drawn steel wire, 7 tons of steel tubes and 1 ton of steel bars from Sweden.

Warehouse Business

Jobbers have followed the lead of mills and have reduced prices, effective July 5. Levels have been lowered $1 to $4 per ton. Plates and shapes are down $1 to 2.95c., and merchant bars are down $2 to 2.90c. The sharpest cut was in hot-rolled annealed sheets to 3.05c., for No. 10 gage, a decline of $4. Orders are light, though bookings last week were fair.

Scrap

The market has weakened and several grades have been reduced 50c. to $1 per ton. No. 2 heavy melting steel is off 50c. at a range of $8.50 to $9, while a drop of $1 has been made in No. 1 railroad wrought and rerolling rails. Several mills are holding up shipments temporarily and this has been a factor in easing the market. Dealers are not stocking because of the uncertain trend of the market.

Pacific Coast Orders Are Well Sustained

SAN FRANCISCO, July 9.—Announcement of decreases in mill prices was somewhat of a surprise to the trade. Merchant bars, plates and structural steel are scheduled to drop $1 a ton and will be listed at 2.35c. Sheets will sell at $3 under the present prices. Despite the reduction in prices mills expect the continuance of lower production that has marked the first week of the quarter. New warehouse schedules will be filed shortly.

Coast shipping continues to be blockaded by the marine strike. Partial opening of the port at San Francisco resulted in such severe rioting that the National Guard was called out to patrol the waterfront. If the striking unions are successful in their attempt to call a general strike all business in San Francisco will be at a standstill and martial law may follow. Repeated attempts at arbitration have deadlocked over the issue of the control of hiring halls. The steel business has suffered from inability to move material and the lessening of demand from marine sources.

Bookings during the week were largely concentrated in southern California although it was reported that Wallace Bridge & Structural Steel Co. took 1600 tons of structural steel for the Deception and Canoe Pass bridges in Washington. Consolidated Steel Corpn. was awarded 535 tons of structural steel on two projects. No definite lettings have yet been announced on the Bonneville power house and substructure or on the Grand Coulee dam. It is reported that Poole & McGonigle are low on 650 tons of structural steel for the Umpqua River bridge in Oregon on which the general contract is yet pending.

Outstanding among new projects was the call for bids at Stockton, Cal., for a wharf and transit shed. It is estimated that 1500 tons of reinforcing bars, 750 tons of structural steel and 150 tons of galvanized sheets will be required. New business added during the week totaled 1943 tons of structural steel and 2113 tons of reinforcing bars.

City of Philadelphia has placed an order for 500 voting machines with the Burger Mfg. Co., Canton, Ohio.

Industry Asks Exemption From Less than Code Prices

WASHINGTON, July 10.—General Johnson this afternoon announced that the iron and steel industry, along with others, has asked exemption from the Presidential order which would permit submission of bids on Government contracts at less than code prices. The Administrator said he would act on the petition of the industry before he leaves Washington tomorrow and notify the American Iron and Steel Institute of his action.

The statement by the Administrator was made after the legal division had issued a ruling for the steel institute holding in effect that the lowered prices on Government business would not have to be applied to general buyers. The ruling, however, was made after the petition for exemption was received.

The General said that if the President's order should result in cutthroat competition he would ask that a change be made in the order.

George A. Lynch in Charge of NRA

WASHINGTON, July 10.—Administrator Johnson today denied that a five man board or any other board will administer NRA during his absence on a speaking tour and vacation. Instead, he stated, George A. Lynch, executive officer, will have charge.

He said, however, he had recommended to the President the setting up of a commission to administer the NRA if it is to continue. He declared that it is necessary to do this as the NRA passes into the field of administration.

He went on record in opposition to the control of industry by a business council unless the public was given protection by Government representatives with veto power. This statement was based on suggestions that code authorities set up councils to conduct industry.

New Manual on Stainless Clad Fabrication

THE first comprehensive guide to the fabrication of stainless clad steel has just been issued by the Ingersoll Steel and Disc. Co., 310 South Michigan Ave., Chicago (division of the Borg-Warner Corpn.). This 16 page booklet is entitled "Manual of Welding and Fabricating Procedures for IngAclad Stainless Clad Steel," and takes up, step by step, the various methods of welding, soldering, lock seaming, riveting, deep drawing, pickling, heat treating, etc., encountered in fabricating products of stainless clad steel. The manual contains many diagrams to guide the fabricator in working with the material.

A distinctive feature of the manual is an illustrated section showing actual installations and applications of IngAclad in a wide range of industries. These include the food, soap, chemical, paper, brewing, dairy, building, and other industries that have used the material and subjected it to all of the procedures described in the manual.

Other sections of this booklet are devoted to a description of the method of producing IngAclad by the original welded-in-the-ingot process, the physical properties of the clad material, etc.

This is the first time, so far as can be ascertained, that any manufacturer or supplier of stainless clad steel has brought out, for general distribution among fabricators and potential users of corrosion resistant metals, a manual giving definite information as to the welding and fabricating technique to be used in working with stainless clad steel.

Detroit Scrap Market Continues Unchanged

DETROIT, July 10.—Scrap prices continue to reflect the disinterested attitude of buyers who are refraining from making new commitments and who are holding up deliveries on current obligations. Considerable tonnages of scrap will come out of automotive plants this month, probably resulting in depressing prices further unless consumer demand should unexpectedly turn upward.

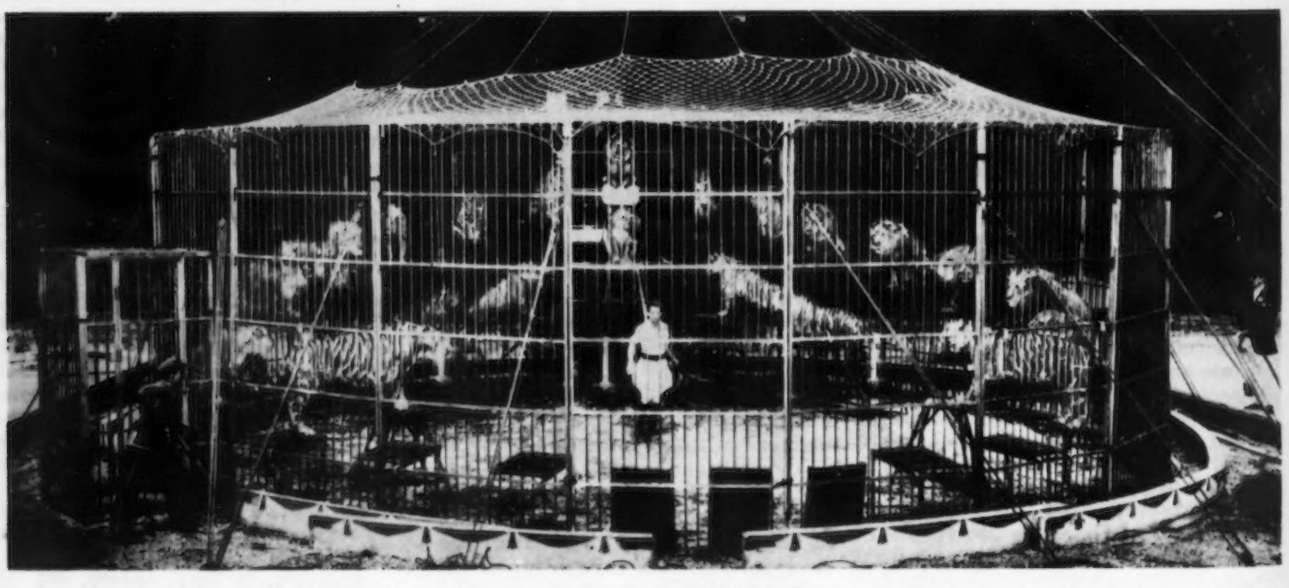
Chicago Iron and Steel Market

(Concluded from Page 58)

pacity, but releases of track supplies are light. Light rails are inactive.

Scrap

The market is exceedingly dull and while consumers are buying little, current offers of sellers indicate that prices have declined at least 25c. a ton. One local mill is restricting shipments in keeping with curtailed production and stocks of boat scrap on dock are no longer moving because of hold-ups by mills at Lake Erie ports.



A new den for a modern Daniel is shown above. The gentleman in white is Clyde Beatty and at his back are a dozen or more of his jungle "pets." The giant cage which encloses the famous wild animal act is made of aluminum alloy sections.

Fabricated Structural Steel

Awards in Fair Volume—New Projects Again Decline

STRUCTURAL steel lettings, at 20,300 tons, compare with 10,550 tons in the previous week and 8700 tons two weeks ago. Superstructure for a toll bridge across the Mississippi River at Bettendorf, Iowa, requiring 4800 tons, and 2325 tons for pier reinforcements at the Bonneville Dam in Oregon are the outstanding awards. New projects of 7500 tons are the lowest since the first week in March and are mostly for jobs requiring small tonnages. The only fresh inquiry of size is 1200 tons for the Kensington high school in Buffalo, on which bids will be taken Aug. 2, Plate awards total 2260 tons. Sheet steel piling awards for Fort Peck, Mont., total between 12,000 to 14,000 tons. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Newton, Mass., 100 tons, school, to West End Iron Works, Cambridge, Mass.

Jersey City, N. J., 1800 tons, armory, to Oltmer Iron Works.

North Branch, N. J., 265 tons, bridge for Central Railroad of New Jersey, to Fort Pitt Bridge Works Co.

Irwin, Pa., 410 tons, mill building, to Rogers Structural Steel Co.

Philadelphia and Montgomery Counties, Pa., 245 tons, bridge, to Phoenix Bridge Co.

Fillmore, N. Y., 115 tons, railroad bridge, to American Bridge Co.

SOUTH AND SOUTHWEST

Lake Charles, La., 510 tons, alkali plant, to Virginia Bridge & Iron Co., Inc.

CENTRAL STATES

Walnut Ridge, Ark., 250 tons, State highway bridge, to Vincennes Bridge Co.

Detroit, 1400 tons, hot strip mill at Rouge plant for Ford Motor Co., to McClintic-Marshall Corpn.

Sault Ste. Marie, Mich., 775 tons, Ashmun Street bridge, to Lackawanna Steel Construction Corpn.

Lemont, Ill., 1000 tons, bridge over Sag Channel for Sanitary District of Chicago, to McClintic-Marshall Corpn.

Lemont, Ill., 1107 tons, bridge over drainage canal, to Mississippi Valley Structural Steel Co.

Illinois Central Railroad, 110 tons, grade crossing elimination at Decatur, Ill., to Mississippi Valley Structural Steel Co.

Winneshiek County, Iowa, 180 tons, State highway bridge, to McClintic-Marshall Corpn.

State of Iowa, 750 tons, highway bridges, to Pittsburgh-Des Moines Steel Co.

Bettendorf, Iowa, 4800 tons, superstructure for toll bridge over Mississippi River, to McClintic-Marshall Corpn.

WESTERN STATES

Rockyford, Colo., 350 tons, State highway project, to American Bridge Co.

Huntington Beach, Cal., 110 tons, elementary school, to Soule Steel Co.

Beverly Hills, Cal., 275 tons, repair of two schools, to Consolidated Steel Corpn.

Los Angeles, 200 tons, school, to Minneapolis-Moline Power Implement Co.

Los Angeles County, Cal., 260 tons, bridge over Alhambra Wash, to Consolidated Steel Corpn.

Delmar, Cal., 210 tons, bridge, to Consolidated Steel Corpn.

State of Oregon, 1120 tons, highway bridges at Florence and Reedsport, to Poole & McGonigle, Portland.

Bonneville, Ore., 2325 tons, pier reinforcements for Bonneville Dam, to McClintic-Marshall Corpn.

Olympia, Wash., 1600 tons, Deception and Canoe Pass bridges, to Wallace Bridge & Structural Steel Co.

Fort Peck, Mont., 12,000 to 14,000 tons of sheet steel piling, divided between Illinois Steel Co. and Jones & Laughlin Steel Corpn.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

State of Vermont, 150 tons, three State bridges.

Natick, Mass., 175 tons, State storage shed.

New York, 1100 tons, West 205th Street viaduct; bids readvertised.

New York, 5000 tons, Hudson River Pier 88; William Kennedy Construction Co. low bidder on general contract.

New York, 6000 tons, Hudson River Piers 90 and 92; George F. Driscoll Co. low bidder on general contract.

Westville, N. J., 355 tons, State highway bridge.

Blairsville, Pa., 830 tons, State highway bridge over Conemaugh River.

Buffalo, 1200 tons, Kensington high school; bids Aug. 2.

THE SOUTH

Louisville, Ky., 100 tons, building.

Sheffield, Ala., 250 tons, dam.

Baton Rouge, La., 100 tons, building.

Greenville, Miss., 250 tons, United States Gypsum warehouse.

CENTRAL STATES

Monticello, Ind., 360 tons, bridge over Tippecanoe River; bids taken by State Highway Commission July 10.

Chicago, 600 tons, subway under Chicago & Western Indiana Railroad at Ninety-fifth Street and Stony Island Avenue; bids to be taken by State Highway Commission, July 24.

Hibbing, Minn., 800 tons, municipal recreation building.

State of Wisconsin, 500 tons, three State highway bridges.

WESTERN STATES

Catron County, N. M., 100 tons, bridge for Bureau of Public Roads, bids under advisement.

Yellowstone National Park, Wyo., 180 tons, Bureau of Public Roads bridge over Cascade River; bids soon.

Kern County, Cal., 105 tons, State paving near Fort Tejon; bids July 25.

Stockton, Cal., 750 tons, city wharf and transit shed; bids July 17.

San Diego, Cal., 700 tons, seven hangars at Naval Base; bids under advisement.

FABRICATED PLATE

AWARDS

Canandaigua, N. Y., 100 tons, water tank and tower for Veterans' Hospital, to Chicago Bridge & Iron Works.

Hopewell, Va., 135 tons, oil storage tanks for City Point Oil Terminal, to Hammond Iron Works.

Vicksburg, Miss., 640 tons, 44 pontoons for United States Engineer Office, to McClintic-Marshall Corpn.

Merced, Cal., 130 tons, storage tank, to Pittsburgh-Des Moines Steel Co.

Los Angeles, 250 tons, welded pipe for Department Water and Power, to Western Pipe & Steel Co.

Yuba, Cal., 1000 tons, dredge hull for Yuba Construction Co., to Moore Dry Dock Co.

NEW PROJECTS

Boston, 1500 tons, Jamaica Plain water pipe line.

Arlington Heights, Ill., 150 tons, water tank.

San Francisco, 175 tons, material for Twelfth Naval District, Schedule 4667; bids under advisement.

Republic-Corrigan McKinney Merger Reported Near

CLEVELAND, July 10.—Negotiations between Republic Steel Corpn. and Corrigan-McKinney Steel Co., which have been carried on from time to time for the past two or more years, may be developing to a conclusion. Both Tom M. Girdler and Donald B. Gillies have announced that definite proposals will soon be reported to the boards of both companies.

It has been known for some time that banking interests represented by the liquidator of the Union Trust Co., Cleveland, favored the carrying out of some consolidation plan that would prove beneficial in cleaning up the affairs of the bank now in process of liquidation.

The bank has an interest in the Corrigan, McKinney Co. through a loan to the Cleveland Cliffs Iron Co., which owns 62½ per cent of the Corrigan, McKinney stock. To purchase this interest in the Corrigan, McKinney Co., the Cleveland Cliffs company secured a loan from the Union Trust Co. and some banks outside of Cleveland. The loan of the Union Trust Co. to the Cleveland Cliffs Co. amounted to $6,956,375, according to inventory of assets filed a year ago. It stated that should the sale be effected the probability that the Union Trust Company's loan would be liquidated will be greatly enhanced. The rumored consideration of the Corrigan, McKinney plant is about $33,000,000 in first mortgage bonds and stocks.

The consolidation, if effected, will increase the ingot capacity of Republic 1,100,000 tons to about 6,000,000 tons. In an announcement of the factors prompting the proposed merger, Mr. Girdler and Mr. Gillies stated: "A diversified line of products, advantageous locations and other economic considerations making for large savings dictated the desirability of the consolidation which has been attempted several times in the past without success."

Prices of Finished Steel and Iron Products

Note: Prices in Italics on These Pages Have Been Reduced, But Lower Quotations Are Not Yet Effective. Reductions Are Mentioned in Market Pages.

BARS, PLATES, SHAPES

Iron and Steel Bars

	Soft Steel	*Base per Lb.*
F.o.b. Pittsburgh		1.80c.
F.o.b. Chicago		1.85c.
F.o.b. Gary		1.85c.
F.o.b. Duluth		*2.05c.*
Del'd Detroit		1.95c.
F.o.b. Cleveland		1.85c.
F.o.b. Buffalo		*2.00c.*
Del'd Philadelphia		2.09c.
Del'd New York		2.13c.
F.o.b. Birmingham		*2.05c.*
F.o.b. cars dock Gulf ports		*2.30c.*
F.o.b. cars dock Pacific ports		*2.45c.*

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh	*1.80c.*
F.o.b. Chicago	*1.85c.*
F.o.b. Gary	*1.85c.*
F.o.b. Moline, Ill.	*1.85c.*
F.o.b. Cleveland	*1.85c.*
F.o.b. Buffalo	*1.90c.*
F.o.b. Birmingham	*1.95c.*
F.o.b. cars dock Gulf ports	*2.20c.*
F.o.b. cars dock Pacific ports	*2.35c.*

Billet Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	*2.60c.*

Rail Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	*2.45c.*

Iron

F.o.b. Chicago	*1.90c.*
F.o.b. Terre Haute, Ind.	*1.85c.*
F.o.b. Reading, Pa.	
F.o.b. Danville, Pa.	
F.o.b. Berwick, Pa.	

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.10c.
F.o.b. Chicago	2.15c.
F.o.b. Gary	2.15c.
F.o.b. Cleveland	2.15c.
F.o.b. Buffalo	2.20c.
Del'd Detroit	2.30c.
Del'd eastern Michigan	2.35c.

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts

	Base per Net Ton
F.o.b. Pittsburgh	$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston	59.00
F.o.b. cars dock Pacific ports	67.00

Plates

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.985c.
F.o.b. Coatesville	*1.95c.*
F.o.b. Sparrows Points	*1.95c.*
Del'd Philadelphia	*2.035c.*
Del'd New York	*2.13c.*
F.o.b. Birmingham	*2.00c.*
F.o.b. cars dock Gulf ports	*2.25c.*
F.o.b. cars dock Pacific ports	*2.40c.*
Wrought iron plates, f.o.b. P'gh	3.00c.

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
Del'd Cleveland	1.985c.
F.o.b. Buffalo	*1.95c.*
F.o.b. Bethlehem	*1.95c.*
Del'd Philadelphia	*2.055c.*
Del'd New York	*2.1025c.*
F.o.b. Birmingham (standard)	*2.00c.*
F.o.b. cars dock Gulf ports	*2.25c.*
F.o.b. cars dock Pacific ports	*2.40c.*

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.14c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	*2.55c.*

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.45c.
No. 24, f.o.b. Gary	2.55c.
No. 24, del'd Detroit	2.65c.
No. 24, del'd Phila.	2.74c.
No. 24, f.o.b. Birmingham	2.60c.
No. 24, f.o.b. dock cars Pacific ports	*3.25c.*
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	*2.65c.*
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.79c.
No. 10 gage, f.o.b. Birmingham	2.65c.
No. 10 gage, f.o.b. dock cars Pacific ports	*3.15c.*

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.24c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 20 gage, f.o.b. dock cars Pacific ports	*3.70c.*

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.39c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24, f.o.b. dock cars Pacific ports	*3.85c.*
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.45c.
F.o.b. cars dock Pacific ports	*4.35c.*

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock, Pacific Coast ports	*3.35c.*

Tin Plate *Base per Box*

Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., P'gh	1.85c.
All widths up to 24 in., Chicago	1.95c.
All widths up to 24 in., del'd Detroit	2.05c.
All widths up to 2¼ in., Birmingham	*2.15c.*
Cooperage stock, Pittsburgh	2.10c.
Cooperage stock, Chicago	2.20c.

Cold-Rolled Strips

	Base per Lb.
F.o.b. Pittsburgh	*2.80c.*
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.88c.
F.o.b. Worcester	2.80c.

Fender Stock

No. 16 and heavier, Pittsburgh or Cleveland	*3.20c.*
F.o.b. Worcester	*3.60c.*
No. 17 and lighter, Pittsburgh or Cleveland	*3.50c.*
F.o.b. Worcester	*3.90c.*

Hot-Rolled Rail Steel Strips

	Base per Lb.
F.o.b. Pittsburgh	*1.80c.*
F.o.b. Chicago	*1.85c.*
F.o.b. Birmingham	*1.95c.*

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade	*Per Lb.*
Bright wire	2.30c.
Spring wire	3.20c.

To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

	Base per Keg
Standard wire nails	$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

	Base per 100 Lb.
Annealed fence wire	$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

On manufacturers' wire prices at Pacific ports are $9 above the Pittsburgh base. On high-carbon spring wire, prices at Pacific ports are also $9 above Pittsburgh. On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi are $6 a ton over Pittsburgh, while New Orleans and Pacific Coast prices are $8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are $11 a ton above Pittsburgh.

Wire Hoops, Twisted or Welded

	Off List
F.o.b. Pittsburgh	35 and 2½ off
F.o.b. Chicago	35 off

Bale Ties, Single Loop

	Base per Net Ton
F.o.b. Pittsburgh	$62.00
F.o.b. Chicago	64.00
F.o.b. Duluth	65.00
F.o.b. Cleveland	63.00
F.o.b. Birmingham	66.00
F.o.b. cars dock Houston, Galveston, Beaumont, Orange or Corpus Christi, Tex.	72.00
F.o.b. cars dock Pacific ports	74.00

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel Inches	Black	Galv.	*Wrought Iron* Inches	Black	Galv.
⅛	51½	29½	⅛	+9	1½+13
¼ to ⅜	53½	35	¼ & ⅜	+1	½+21½
½	58½	47	½	+3	1½ 15
¾	62	52	¾	+3	6½ 20½
1 to 3	64	55	1 & 1¼	+3	9½ 25½
			1½	+4	3½ 28
			2	+4	1½ 26

Lap Weld

2	60	51	2	37	22½
2½ to 3	63	54	2½ to 3½	38	25
3½ to 6	65	56	4 to 8	40	28½
7 and 8	64	54	9 to 12	38	24½
9 and 10	63½	53½			
11 and 12	62½	52½			

Butt Weld, extra strong, plain ends

⅛	48½	33½	⅛	+13	+45½
¼ to ⅜	51	38	¼ & ⅜	+2½	+34½
½	56½	47½	½	+3	2½ 17½
¾	61	52	¾	+3	7½ 22½
1 to 3	63	55	1 to 2	+3	3½ 29

Lap Weld, extra strong, plain ends

2	58	50	2	40	26
2½ to 3	62	54	2½ to 4	45½	33
3½ to 6	65½	57½	4½ to 6	45	33½
7 and 8	64½	54½	7 & 8	46	33
9 and 10	63½	53½	9 to 12	41½	30
11 and 12	62½	52½			

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5's off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5's off are allowed to consumers and three 5's off to jobbers.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	....
1¼ in. o.d.	13 B.W.G.	10.19	....
1½ in. o.d.	13 B.W.G.	11.26	....
1¾ in. o.d.	13 B.W.G.	12.81	....
2 in. o.d.	13 B.W.G.	14.35	$13.04
2¼ in. o.d.	13 B.W.G.	16.00	14.54
2½ in. o.d.	12 B.W.G.	19.29	17.54
2¾ in. o.d.	12 B.W.G.	20.45	18.59
3 in. o.d.	12 B.W.G.	21.45	19.50
3¼ in. o.d.	11 B.W.G.	25.22	22.93
3½ in. o.d.	11 B.W.G.	27.09	24.63
4 in. o.d.	10 B.W.G.	33.60	30.54
4½ in. o.d.	10 B.W.G.	41.08	37.35
5 in. o.d.	9 B.W.G.	51.56	46.87
6 in. o.d.	7 B.W.G.	79.15	71.94

Extras for less-carload quantities:

25,000 lb. or ft. to 39,999 lb. or ft.	5 %
10,000 lb. or ft. to 24,999 lb. or ft.	12½%
2,000 lb. or ft. to 9,999 lb. or ft.	25 %
Under 2,000 lb. or ft.	40 %

Hot-Finished Lapweld Steel Pressure Tubes

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

1½ in. o.d.	13 B.W.G.	$ 9.71
1¾ in. o.d.	13 B.W.G.	11.00
2 in. o.d.	13 B.W.G.	12.30
2¼ in. o.d.	13 B.W.G.	13.79
2½ in. o.d.	12 B.W.G.	16.58
2¾ in. o.d.	12 B.W.G.	17.54
3 in. o.d.	12 B.W.G.	18.35
3¼ in. o.d.	11 B.W.G.	21.54
3½ in. o.d.	11 B.W.G.	23.15
4 in. o.d.	10 B.W.G.	28.66
4½ in. o.d.	10 B.W.G.	35.22
5 in. o.d.	9 B.W.G.	44.35
6 in. o.d.	7 B.W.G.	68.14

Quantity Extras:

40,000 lb. or ft.	base
25,000 lb. or ft. to 39,999 lb. or ft.	plus 5 %
10,000 lb. or ft. to 24,999 lb. or ft.	plus 12½%
2,000 lb. or ft. to 9,999 lb. or ft.	plus 25 %
Under 2,000 lb. or ft.	plus 40 %

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$47.00
4-in., del'd Chicago	50.00
6-in. and larger, del'd New York	45.00
4-in. del'd New York	48.00
6-in., and larger, Birmingham	39.00
4-in. Birmingham	42.00

Class "A" and gas pipe, $3 extra

RAILROAD MATERIALS

Rails and Track Supplies

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$36.37½
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$35.00
Light rails (from rail steel) per gross ton	34.00

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.40
Spikes, ½ in. and smaller	2.40
Spikes, boat and barge	2.40
Tie plates, steel	1.90
Track bolts, to steam railroads	3.55
Track bolts, no jobbers, all sizes (per 100 count)	70 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Buffalo, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapolis, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; on spikes alone, Cleveland, Youngstown, Lebanon, Pa., Columbia, Pa., Richmond, Va., Jersey City, N. J.

Girder Rails

	Per Gross Ton
F.o.b. Lorain	$47.00
F.o.b. Steelton	47.00

Splice Bars for Girder Rails

	Base per 100 Lb.
F.o.b. Lorain and Steelton	$4.30

Steel Car Axles

	Base per Lb.
F.o.b. Pittsburgh	2.65c.
F.o.b. Chicago	2.65c.
F.o.b. Birmingham	2.65c.

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Stove bolts in packages, Pittsburgh	75
Stove bolts in packages, Chicago	75
Stove bolts in packages, Cleveland	75
Stove bolts in bulk, P'gh	83
Stove bolts in bulk, Chicago	83
Stove bolts in bulk, Cleveland	83
Tire bolts	60

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	75, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85
Upset set screws, cut and oval point	75 and 10
Milled studs	65

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Uncropped .....$42 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $51 a gross ton.
Price del'd Detroit is $54.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base.....2.55c. a lb.
Delivered price at Detroit is 2.70c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (½% Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.59
4130 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.95
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.05c. base per lb.

STAINLESS STEEL No. 302

(17 to 19% Cr, 7 to 9% Ni, 0.08 to 0.20% C)

(Base Prices, f.o.b. Pittsburgh)

	Per Lb.
Bars	23c.
Plates	26c.
Sheets	33c.
Hot-rolled strip	20¾c.
Cold-rolled strip	27c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.
Uncropped .....$29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham.
Uncropped .....$31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.

	Per Gross Ton
Rerolling	$27.00
Forging quality	*$4.00*
Delivered Detroit	
Rerolling	*$32.00*
Forging	*$37.00*
Billets Only F.o.b. Duluth	
Rerolling	*$31.00*
Forging	*$36.00*

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$28.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Tube Rounds

	Base per Lb.
F.o.b. Pittsburgh	*1.90c.*
F.o.b. Chicago	*1.95c.*
F.o.b. Cleveland	*1.95c.*
F.o.b. Buffalo	*2.00c.*
F.o.b. Birmingham	*2.05c.*

Wire Rods

(Common soft, base)

	Per Gross Ton
F.o.b. Pittsburgh	$38.00
F.o.b. Cleveland	38.00
F.o.b. Chicago	39.00
F.o.b. Anderson, Ind.	39.00
F.o.b. Youngstown	39.00
F.o.b. Worcester, Mass.	40.00
F.o.b. Birmingham	41.00
F.o.b. San Francisco	47.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$19.50	$20.00	$19.00	$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	....	....	19.00	....
Sparrows Point, Md.	19.50	....	19.00	....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	....
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	....
Duluth, Minn.	19.00	19.00	....	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	....	17.00	..

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District From Everett, Mass.	$20.00	$20.50	$19.50	$21.00
Brooklyn From East Pa. or Buffalo	21.77	22.27	21.27	22.77
Newark or Jersey City, N. J. From East. Pa. or Buffalo	20.89	21.39	20.39	21.89
Philadelphia From Eastern Pa.	20.26	20.76	19.76	21.26
Cincinnati From Hamilton, Ohio	19.51	19.51	19.01	20.01
Canton, Ohio From Cleveland and Youngstown	19.76	19.76	19.26	20.26
Columbus, Ohio From Hamilton, Ohio	20.50	20.50	....	....
Mansfield, Ohio From Cleveland and Toledo	20.26	20.26	....	....
Indianapolis From Hamilton, Ohio	20.77	20.77	....	....
South Bend, Ind. From Chicago	20.55	20.55	....	....
Milwaukee From Chicago	19.50	19.50	....	....
St. Paul From Duluth	20.94	....	....	....
Davenport, Iowa From Chicago	20.26	20.26	....	....
Kansas City From Granite City	21.04	21.04	....	....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. $23.50
Johnson City, Tenn. 19.50
Del'd Chicago 25.15

GRAY FORGE PIG IRON

Valley furnace $18.25

CHARCOAL PIG IRON

Lake Superior furnace $21.00
Delivered Chicago 24.04
Delivered Buffalo 24.28

CANADA

Pig Iron

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

	Per Gross Ton
Domestic, 80% (carload)	$85.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$26.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads) (duty paid)	31.00
14% to 16% (less carloads)	38.50

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$22.75	12%	$29.25
7%	23.75	13%	30.75
8%	24.75	14%	32.25
9%	25.75	15%	33.75
10%	26.75	16%	35.25
11%	27.75	17%	36.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$27.75	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 1½ to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W, del., carloads	$1.40 to $1.50
Ferrotungsten, less carloads	1.55 to 1.60
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr, per lb. contained Cr, delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained V	$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti, 6 to 8% C, f.o.b. furnace carload and contract per net ton	$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$38.00
Ton lots or less, per ton	45.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	$11.50 to $12.00
No. 2 heavy melting steel	10.50 to 11.00
No. 3 railroad wrought	11.50 to 12.00
Scrap rails	11.50 to 12.00
Rails 3 ft. and under	14.50 to 15.00
Compressed sheet steel	11.00 to 11.50
Hand bundled sheet steel	10.00 to 10.50
Hvy. steel axle turnings	11.00 to 11.50
Machine shop turnings	7.50 to 8.00
Short shov. turnings	7.50 to 8.00
Short mixed borings and turnings	7.00 to 7.50
Cast iron borings	7.00 to 7.50
Cast iron carwheels	11.50 to 12.00
Heavy breakable cast	10.00 to 10.50
No. 1 cast	12.00 to 12.50
Railr. knuckles and couplers	13.75 to 14.25
Rail. coil and leaf springs	13.75 to 14.25
Rolled steel wheels	13.75 to 14.25
Low phos. billet crops	15.00 to 15.50
Low phos. sheet bar crops	14.50 to 15.00
Low phos. plate scrap	13.50 to 14.00
Low phos. punchings	14.00 to 14.50
Steel car axles	14.50 to 15.00

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton	
Heavy melting steel	$9.25 to $9.75
Automobile hvy. melt. steel	8.50 to 9.00
Shoveling steel	9.25 to 9.75
Hydraulic comp. sheets	8.25 to 8.75
Drop forge flashings	7.25 to 7.75
No. 1 busheling	7.75 to 8.25
Rolled carwheels	10.00 to 10.50
Railroad tires	10.00 to 10.50
Railroad leaf springs	10.00 to 10.50
Axle turnings	7.75 to 8.25
Steel couplers and knuckles	9.75 to 10.25
Coil springs	10.00 to 10.50
Axle turnings (elec. fur.)	8.25 to 8.75
Low phos. punchings	10.25 to 10.75
Low phos. plates, 12 in. and under	10.25 to 10.75
Cast iron borings	4.75 to 5.25
Short shoveling turnings	4.75 to 5.25
Machine shop turnings	4.75 to 5.25
Rerolling rails	10.25 to 10.75
Steel rails, less than 3 ft.	10.25 to 10.75
Steel rails, less than 2 ft.	10.75 to 11.25
Angle bars, steel	10.00 to 10.50
Cast iron carwheels	9.50 to 10.00
Railroad malleable	9.50 to 10.00
Agricultural malleable	7.75 to 8.25

Per Net Ton	
Iron car axles	$11.00 to $11.50
Steel car axles	10.25 to 10.75
No. 1 railroad wrought	7.25 to 8.25
No. 2 railroad wrought	8.00 to 8.50
No. 2 busheling	2.50 to 3.00
Locomotive tires, smooth	8.25 to 8.75
Pipe and flues	3.75 to 4.25
No. 1 machinery cast	7.25 to 7.75
Clean automobile cast	7.25 to 7.75
No. 1 railroad cast	6.75 to 7.25
No. 1 agricultural cast	5.75 to 6.25
Stove plate	5.25 to 5.75
Grate bars	4.75 to 5.25
Brake shoes	6.25 to 6.75

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	$10.50
No. 2 heavy melting steel	$8.50 to 9.00
No. 1 railroad wrought	11.00 to 11.50
Bundled sheets	9.50
Hydraulic compressed, new	10.00
Hydraulic compressed, old	7.00
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	9.00 to 9.50
Cast borings	5.50 to 6.00
Heavy breakable cast	10.50
Stove plate (steel works)	8.00 to 8.50
No. 1 low phos. heavy	15.00
Couplers and knuckles	14.00 to 14.50
Rolled steel wheels	14.00 to 14.50
No. 1 blast furnace	5.50 to 6.00
Spec. iron and steel pipe	8.00
Shafting	15.00 to 16.00
Steel axles	14.50
No. 1 forge fire	9.50
Cast iron car wheels	11.00 to 11.50
No. 1 cast	11.50 to 12.00
Cast borings (chem.)	12.00 to 14.00
Steel rails for rolling	12.00

CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel	$7.25 to $7.75
Scrap rails for melting	8.25 to 8.75
Loose sheet clippings	3.75 to 4.25
Bundled sheets	5.75 to 6.25
Cast iron borings	5.00 to 5.50
Machine shop turnings	4.75 to 5.25
No. 1 busheling	6.25 to 6.75
No. 2 busheling	2.75 to 3.25
Rails for rolling	8.75 to 9.25
No. 1 locomotive tires	8.50 to 9.00
Short rails	11.25 to 11.75
Cast iron carwheels	7.75 to 8.25
No. 1 machinery cast	9.00 to 9.50
No. 1 railroad cast	8.50 to 9.00
Burnt cast	6.00 to 6.50
Stove plate	6.00 to 6.50
Agricultural malleable	8.00 to 8.50
Railroad malleable	8.00 to 8.50

CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	$9.50 to $10.00
No. 2 heavy melting steel	9.00 to 9.50
Compressed sheet steel	9.00 to 9.50
Light bundled sheet stampings	7.25 to 7.50
Drop forge flashings	8.75 to 9.25
Machine shop turnings	7.00 to 7.50
Short shoveling turnings	7.50 to 7.75
No. 1 busheling	8.75 to 9.25
Steel axle turnings	8.25 to 8.75
Low phos. billet crops	13.25 to 13.75
Cast iron borings	7.00 to 7.50
Mixed borings and short turnings	7.00 to 7.50
No. 2 busheling	7.00 to 7.50
No. 1 cast	11.50 to 11.75
Railroad grate bars	7.00 to 7.50
Stove plate	6.50 to 7.00
Rails under 3 ft.	14.50 to 15.00
Rails for rolling	16.00 to 16.50
Railroad malleable	11.50 to 12.00
Cast iron carwheels	10.75 to 11.25

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel	$10.50 to $11.00
No. 2 heavy melting scrap	9.00 to 9.50
Scrap rails	10.00 to 10.50
New hydraul. comp. sheets	9.00 to 9.50
Old hydraul. comp. sheets	8.00 to 8.50
Drop forge flashings	9.00 to 9.50
No. 1 busheling	9.00 to 9.50
Hvy. steel axle turnings	7.00 to 7.50
Machine shop turnings	5.00 to 5.50
Knuckles and couplers	11.50 to 12.00
Coil and leaf springs	11.50 to 12.00
Rolled steel wheels	11.50 to 12.00
Low phos. billet crops	12.00 to 12.50
Short shov. steel turnings	6.00 to 6.50
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	6.00 to 6.50
Steel car axles	11.00 to 11.50
Iron axles	11.00 to 11.50
No. 1 machinery cast	10.50 to 11.00
No. 1 cupola cast	8.50 to 9.00
Stove plate	8.50 to 8.75
Steel rails, 3 ft. and under	12.00 to 12.50
Cast iron carwheels	10.50 to 11.00
Industrial malleable	10.50 to 11.00
Railroad malleable	10.50 to 11.00
Chemical borings	7.50 to 8.00

BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	$5.75 to $6.25
Scrap T rails	5.75 to 6.25
No. 2 steel	5.00 to 5.25
Breakable cast	6.00 to 6.50
Machine shop turnings	1.75 to 2.00
Bundled skeleton, long	4.00 to 4.25
Forge flashings	4.00 to 4.25
Blast furnace scrap	2.00 to 2.50
Shafting	11.00 to 11.25
Steel car axles	10.50 to 11.00
Cast iron borings, chemical	8.25 to 8.50
Stove plate	6.50
Per gross ton delivered consumers' yards:	
Textile cast	$7.50 to $9.00
No. 1 machinery cast	7.50 to 9.00
Railroad malleable	11.00 to 11.50

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	*$7.00 †$8.00
No. 2 heavy melting steel	*5.50 to †6.50
Heavy breakable cast	6.75 to 7.25
No. 1 machinery cast	8.00
No. 2 cast	6.25 to 6.75
Stove plate	5.50
Steel car axles	10.75 to 11.50
No. 1 railroad wrought	7.50 to 8.00
No. 1 yard wrought, long	6.50 to 7.00
Spec. iron and steel pipe	4.50 to 5.00
Forge fire	5.50 to 6.00
Rails for rerolling	8.00 to 9.50
Short shoveling turnings	2.50 to 3.00
Machine shop turnings	2.50 to 3.00
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	3.00 to 4.00
Per gross ton, delivered local foundries:	
No. machinery cast	$10.75
No. 1 hvy. cast (cupola size)	9.75
No. 2 cast	8.25

*For direct car loading only.
†Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	$10.00
Scrap steel rails	9.00
Short shoveling turnings	5.50
Stove plates	$7.00 to 7.50
Steel axles	10.50 to 11.00
Iron axles	10.50 to 11.00
No. 1 railroad wrought	7.00
Rails for rolling	10.50
No. 1 cast	9.00 to 9.50
Tramcar wheels	9.00 to 9.50
Cast iron borings, chem.	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel	$8.75 to $9.25
No. 1 heavy melting	8.50 to 9.00
No. 2 heavy melting	7.00 to 7.50
No. 1 locomotive tires	9.50 to 10.00
Misc. stand-sec. rails	8.75 to 9.25
Railroad springs	10.25 to 10.75
Bundled sheets	6.75 to 7.25
No. 2 railroad wrought	8.00 to 8.50
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	4.75 to 5.25
Rails for rolling	9.75 to 10.25
Machine shop turnings	4.50 to 5.00
Heavy turnings	5.50 to 6.00
Steel car axles	10.50 to 11.00
Iron car axles	13.00 to 13.50
No. 1 railroad wrought	5.50 to 6.00
Steel rails less than 3 ft.	10.75 to 11.25
Steel angle bars	9.00 to 9.50
Cast iron carwheels	8.00 to 8.50
No. 1 machinery cast	9.00 to 9.50
Railroad malleable	9.00 to 9.50
No. 1 railroad cast	8.50 to 9.00
Stove plate	6.50 to 7.00
Agricult. malleable	9.00 to 9.50

DETROIT

Dealers' buying prices per gross ton:	
Heavy melting steel	$7.00 to $7.50
Borings and short turnings	5.00 to 5.50
Long turnings	$4.00 to $4.50
No. 1 machinery cast	9.00 to 9.50
Automotive cast	10.00 to 10.50
Hydraul. comp. sheets	7.00 to 7.50
Stove plate	6.50 to 7.00
New factory busheling	6.00 to 6.50
Old No. 2 busheling	4.25 to 4.75
Sheet clippings	3.50 to 4.00
Flashings	6.00 to 6.50
Low phos. plate scrap	7.50 to 8.00

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$5.50	$5.50
Rails scrap	6.00	6.00
Machine shop turnings	2.50	2.50
Boiler plate	4.50	4.50
Heavy axle turnings	2.50	2.50
Cast borings	3.00	3.00
Steel borings	2.00	2.00
Wrought pipe	2.50	2.50
Steel axles	4.50	4.00
Axles wrought iron	4.50	4.50
No. 1 machinery cast	7.75	9.00
Stove plate	4.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton	
Old range, Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit	
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	9.50c.
Iron, low phos., Swedish, average 68½% iron	9.50c.
Iron, basic or foundry, Swedish, average, 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52%	24c.
Manganese, African, Indian, 44-48%	21c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48½	20c.

Per Net Ton Unit	
Tungsten, Chinese, wolframite, duty paid, delivered*	$18.00 to $18.75
Tungsten, domestic scheelite, delivered†	17.00

Per Gross Ton	
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	$17.00
Chrome, 48% Cr_2O_3, c.i.f. Atlantic Seaboard	20.00

*Quotations nominal in absence of sales.
†Nominal; no supplies available.

Fluorspar

Per Net Ton	
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines for all-rail shipment	$17.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	18.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	$17.50 to 18.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

Per Net Ton	
Furnace, f.o.b. Connellsville Prompt	$3.85
Foundry, f.o.b. Connellsville Prompt	$4.60 to 5.10
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	$9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

Per Net Ton	
Mine run steam coal, f.o.b. W. Pa. mines	$1.80 to $2.05
Mine run coking coal f.o.b. W. Pa.	2.05 to 2.25
Gas coal, ¾-in. f.o.b. Pa. mines	2.25 to 2.55
Mine run gas coal, f.o.b. Pa. mines	2.05 to 2.45
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.65
Gas slack, f.o.b. W. Pa. mines	1.90 to 2.10

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.38c.
No. 5 industrial fuel oil	3.38c.

Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.75c.
No. 4 industrial	5.50c.
No. 5 industrial	4.75c.

REFRACTORIES

Fire Clay Brick

Per 1000 f.o.b. Works	High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	45.00	40.00
New Jersey	55.00	45.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Chrome Brick

Per Net Ton	
Standard size	$45.00

Silica Brick

Per 1000 f.o.b. Works	
Pennsylvania	$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

Magnesite Brick

Per Net Ton	
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$65.00
Unburned, f.o.b. Baltimore	55.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	45.00
Domestic, f.o.b. Chewelah, Wash.	22.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	3.20c.
Structural shapes	3.20c.
Soft steel bars and small shapes	3.00c.
Reinforcing steel bars	3.00c.
Cold-finished and screw stock—	
Rounds and hexagons	*3.45c.
Squares and flats	*3.45c.
Hoops and bands under ¼ in.	3.35c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.55c.
Galv. sheets (No. 24), 25 or more bundles	4.10c.
Hot-rolled sheets (No. 10)	3.10c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.32
Spikes, large	3.90c.
Track bolts, all sizes, per 100 count,	65 per cent off list.
Machine bolts, 100 count,	65 per cent off list.
Carriage bolts, 100 counts,	65 per cent off list.
Nuts, all styles, 100 count,	65 per cent off list.
Large rivets, base per 100 lb.	$3.50
Wire, black, soft ann'l'd, base per 100 lb.	*2.70c.
Wire, galv. soft, base per 100 lb.	*2.925c.
Common wire nails, per keg	*2.834c.
Cement coated nails, per keg	*2.834c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.20c.
Soft steel bars	2.95c.
Cold-fin. steel bars and shafting	
Rounds and hexagons	3.50c.
Flats and squares	3.50c.
Hot-rolled strip	3.30c.
Hot-rolled annealed sheets (No. 24)	3.90c.
Galv. sheets (No. 24)	4.55c.
Hot-rolled sheets (No. 10)	3.05c.
Spikes (9/16 in. and lighter)	3.50c.
Track bolts	4.65c.
Rivets, structural (keg lots)	3.50c.
Rivets, boiler (keg lots)	3.60c.
	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Coach and lag screws	60 and 5
Hot-pressed nuts, sq. tap. or blank	60 and 5
Hot-pressed nuts, hex. tap or blank	60 and 5
Hex. head and cap screws	85
Cup point set screws	70 and 10
Flat head bright wood screws	37½ and 10
Spring cotters	50
Stove bolts in full packages	70 and 10
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$5.00 off list
No. 8 black ann'l'd wire per 100 lb.	$3.85
Com. wire nails, base per keg	2.05c.
Cement c't'd nails, base per keg	3.05c.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	3.40c.
Structural shapes	3.37c.
Soft steel bars, small shapes	3.22c.
Iron bars	3.22c.
Iron bars, swed. charcoal	6.50 to 7.35c.
Cold-fin. shafting and screw stock;	
Rounds and hexagons	3.92c.
Flats and squares	4.42c.
Cold-roll. strip, soft and quarter hard	3.52c.
Hoops	3.52c.
Bands	3.52c.
Hot-rolled sheets (No. 10)	3.27c.
Hot-rolled ann'l'd sheets (No. 24*)	4.05c.
Galvanized sheets (No. 24*)	4.65c.
Long terne sheets (No. 24)	5.40c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.30c.
Wire, galv. (No. 10)	3.80c.
Tire steel, 1 x ½ in. and larger	3.65c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	$3.21
	Per Cent Off List
Machine bolts, cut thread:	
Up to 1 in. dia. inclusive	60
Over 1 in. dia.	50
Carriage bolts, cut thread:	
Up to ½ in. dia. inclusive	60
Over ½ in. dia.	50
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.49c.
Bars, soft steel or iron	3.29c.
Cold-fin. rounds, shafting, screw stock	3.74c.
Hot-rolled annealed sheets (No. 24)	4.34c.
Galv. sheets (No. 24)	4.94c.
Hot-rolled sheets (No. 10)	3.44c.
Black corrug. sheets (No. 24)	4.39c.
*Galv. corrug. sheets	4.49c.
Structural rivets	3.84c.
Boiler rivets	3.94c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts	
1000 lb. or over	60
200 to 999 lb.	55 and 5
100 to 199 lb.	50 and 5
Less than 100 lb.	50

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	2.95c.
*Structural shapes	2.95c.
*Soft steel bars, small shapes, iron bars (except bands)	2.90c.
‡Reinforc. steel bars, sq. twisted and deformed	2.955c.
Cold-finished steel bars	3.75c.
*Steel hoops	3.40c.
*Steel bands, No. 12 and 3/16 in., incl.	3.15c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	3.60c.
†Galvanized sheets (No. 24)	4.25c.
*Hot-rolled annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, ¼ in.	4.95c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.31c.
Soft steel bars	2.95c.
Reinforc. steel bars	*2.10c.
Cold-finished steel bars	3.40c.
Flat-rolled steel under ¼ in.	3.36c.
Cold-finished strip	†3.00c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.61c.
Hot-rolled sheets (No. 10)	3.11c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c.
Black ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

*Plus mill, size and quantity extras.

†Outside delivery 10c. less.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.45c.
Bars, soft steel or iron	3.25c.
New billet reinforc. bars	3.10c.
Rail steel reinforc. bars	3.10c.
Hoops and bands, 3/16 in. and lighter	3.60c.
Cold-finished bars	3.70c.
Hot-rolled annealed sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	4.85c.
Hot-rolled sheets (No. 10)	3.35c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, 1-in., per 100 lb.	$35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$17.89
4-in.	41.69
Lap-welded steel boiler tubes, 2-in.	16.61
4-in.	38.72

BUFFALO

	Base per Lb.
Plates	3.40c.
Struc. shapes	3.30c.
Soft steel bars	3.10c.
Reinforcing bars	3.10c.
Cold-fin. flats and sq.	3.55c.
Round and hex.	3.55c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	4.05c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.67c.
Galv. sheets (No. 24)	4.65c.
Bands	3.57c.
Hoops	3.57c.
Hot-rolled unannealed sheets	3.32c.
Com. wire nails, base per keg	$3.00
Black wire, base per 100 lb.	3.45c.

BOSTON

	Per Lb.
Beams, channels, angles, tees, zees	3.42c.
H beams and shapes	3.42c.
Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	3.43c.
Floor plates, diamond pattern	5.18c.
Bar and bar shapes (mild steel)	3.25c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.50c. to 4.50c.
Half rounds, half ovals, ovals and bevels	4.50c.
Tire steel	4.50c.
Cold-finished rounds and hexagons	3.70c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.20c.
Blue annealed sheets, No. 10 ga.	3.25c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Galvanized steel sheets, No. 24 ga.	4.60c.
Lead coated sheets, No. 24 ga.	5.65c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

PACIFIC COAST

	Base per Lib.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.55c.	3.70c.	3.55c
Shapes, standard	3.55c.	3.70c.	3.55c.
Soft steel bars	3.60c.	3.70c.	3.55c.
Reinforcing bars	3.50c.	3.50c.	3.50c.
Hot-rolled annealed sheets (No. 24)	4.40c.	4.35c.	4.40c.
Hot-rolled sheets (No. 10)	3.75c.	3.80c.	3.75c
Galv. sheets (No. 24)	5.00c.	5.05c.	5.00c.
Cold finished steel Rounds	5.95c.	5.95c.	4.75c.
Squares and hexagons	7.20c.	7.20c.	6.00c.
Flats	7.70c.	7.70c.	7.00c.
Common wire nails —base per keg less carload	$3.40	$3.25	$3.35

All items subject to differentials for quantity.

Lower Prices Filed on Many Miscellaneous Steel Products

REDUCED prices on a wide variety of miscellaneous steel products have been filed with the American Iron and Steel Institute. Those which are not regularly quoted in these pages have been lowered in amounts corresponding roughly to the reduction in the more common items to which they are related.

Hot-rolled, pickled in the breakdown, annealed, deoxidized sheets, have been reduced $1 a ton to 2.30c., Pittsburgh, for No. 10 gage and $4 a ton to 2.85c., Pittsburgh, for No. 24 gage. The differentials for other basing points are maintained. Cold-finished sheets, mill run, have been reduced $1 a ton for No. 10 gage and $4 a ton for No. 20 gage, with the usual $2 a ton differential under the regular cold-finished grade maintained at all basing points. High grade extra smooth black sheets are now quoted a 3.55c., Pittsburgh, for No. 24 gage. The various grades of electrical sheets have been lowered in amounts ranging upward from $3 a ton. Ingot iron sheets in all finishes have been reduced in amounts corresponding to the reductions on the same finishes of steel sheets. Ingot iron plates and bars have been lowered $1 a ton to 2.10c., Pittsburgh. Corrugated sheets for roofing have been marked down for both painted and galvanized material.

Many changes have been made in alloy steel in keeping with the $2 a ton reduction on alloy steel bars. Bar-sized angles, channels, tees and zees in the alloy grade have been marked down $2 a ton to 2.90c., at all basing points. Internal combustion valve steel and chrome silicon steel, the latter in both the open-hearth and electric furnace grade, are lower. Lower prices have also been filed on both hot-rolled and cold-finished electric furnace plain carbon steel, alloy quality, general requirement grade but not including tool steel grade. The following new prices have been filed on tool steel, f.o.b. Bethlehem, to become effective July 15: Class 5A, bars 25c. a lb. and billets 22.5c.; class 21, bars 12c. and billets 10.2c.; class 22, bars 10c. and billets 8.5c.

Special analysis die block steel has been reduced $2 a ton to $49 a gross ton at all basing points. Prices have also been filed on alloy electric furnace plain carbon steel billets, alloy quality in the general requirement but not including the tool steel grade. They range from $59 to $69 a gross ton at Pittsburgh, Chicago or Bethlehem, depending upon the carbon content, and are effective July 15.

Cold-rolled lamp stock, oiled, has been marked down $4 a ton to 3.40c., Pittsburgh or Cleveland, and 3.80c., Worcester, Mass. Prices of 2.20c., Pittsburgh, and 2.54c., Chicago, have been filed on hot-rolled iron strip, and a quotation of 3.05c., Pittsburgh, on cold-rolled iron strip has been named. Piston ring steel, tempered, polished and colored, and sash balance steel, black tempered, are quoted at 2.80c., Worcester, effective July 19.

New prices have also been filed on subway and elevated wheels, mine locomotive wheels and street car and interurban wheels in both 26-in. and 34-in. tread diameter, all f.o.b. Pittsburgh, effective July 17.

Metals Consumers Purchase Lightly in View of Uncertain Industrial Outlook

Prime Western Strengthens with Improved Conditions in the Joplin Area—Lead Users Consider 3.60c. an Opportune Price

NEW YORK, July 10.—The copper markets, both electrolytic and Lake, continue to be inactive, but prices are not expected to weaken. Consumers are taking shipments steadily on their heavy contracts, and they are not expected to come into the market for fresh supplies before early September. The code authority is now collecting information concerning the potential activity and the amount of copper held by consumers in order to obtain an accurate record of the probable purchasing power of the industry and to obtain data which will be of use in establishing permanent buying agreements for each individual user. The actual domestic consumption of copper is now around 40,000 tons a month, and at this rate it will take some time for any great imprint to be made on surplus stocks under the control of the code authority. This is especially true inasmuch as less metal is being sold abroad and foreign producers are now competing more strenuously for what business there is. The market there has further weakened and was quoted this morning at 7.40c. to 7.45c. a lb., c.i.f. usual Continental base ports. The decline is attributed to heavy liquidation on the standard market and the unsettling influence of political and economic developments in Germany.

Tin

This market is somewhat irregular as regards price, but that is of small import as consumers are still not interested in buying. The tin plate industry is more active than a week earlier but future prospects are not sufficiently encouraging to warrant an expectation of a reappearance of tin demand for at least another month. In England prices are slightly higher as compared with a week earlier with Straits at Singapore quoted at £229 this morning. The strength abroad arose from rumors that production quotas may be cut in September, although some support came from a group purchasing for the buffer pool. However, the lack of demand from America is reflecting in a weak undertone in England and the Far East, and operators there anticipate little fundamental improvement until industrial conditions become more encouraging.

Zinc

Spelter sales tapered off to around 2000 tons last week as a natural aftermath of the heavy bookings of the preceding period. Present commitments are mostly for August delivery. Very little attention is being given to September and positions beyond as users are uncertain as to what their requirements will be at that time. The current price basis of 4.35c. a lb., East St. Louis, is firm and it is possible that advances might occur if Tri-State interests hold to their present plans for the curtailment of ore production. Zinc now has a better statistical outlook than any other major metal as a result of the 5000-ton reduction made in stocks during June. For that month shipments declined to 30,200 tons but production was cut 6000 tons to 25,150 tons. While the reduction of stocks was a healthy development it came from decreased production rather than an expansion of consumer demand. In the Joplin area the prices of concentrates are unaltered at $27 and $28 a ton for flotation and prime grades respectively. Last week the output was almost nil and bin stocks declined 2300 tons to 19,775 tons. Major mining interests expect to reduce the surplus of concentrates to below 15,000 tons this week, and if the restriction program should be extended for several more weeks the market for refined metal would naturally react upward if even a minimum amount of consumer support were forthcoming.

Lead

All important sellers report a satisfactory volume of business at an unaltered price basis of 3.75c. a lb., New York. Prior to the recent price decline most consumers had taken a short position but they are now increasing their plant stocks in order to take advantage of the present low quotations. Assuming an average monthly activity, current bookings represent about a 50 per cent coverage for August and over 75 per cent coverage for July requirements.

Brass and Bronze

The combined May deliveries of ingot brass and bronze made by members of the Non-Ferrous Ingot Metal Institute totaled 5143 tons, as compared with 5223 tons in the preceding month. The average prices paid during the 28-day period ended June 15 by consumers of commercial 85-5-5-5 and commercial 80-10-10 ingots were 8.757c. and 10.268c. a lb. respectively.

The Week's Prices. Cents Per Pound for Early Delivery

	July 5	July 6	July 7	July 9	July 10
Electrolytic copper, N. Y.*‡	8.75	8.75	8.75	8.75	8.75
Lake copper, Eastern delivery*	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, Spot, N. Y.	52.12½	52.00	....	51.87½	51.87½
Zinc, East St. Louis	4.35	4.35	4.35	4.35	4.35
Zinc, New York	4.70	4.70	4.70	4.70	4.70
Lead, St. Louis	3.60	3.60	3.60	3.60	3.60
Lead, New York	3.75	3.75	3.75	3.75	3.75

*Blue Eagle copper. ‡Refinery; price ¼c. higher in Connecticut Valley.

Quotations below cover wholesale lots, f.o.b. New York.

Aluminum, 98-99 per cent, 22.90c. a lb.
Aluminum, remelt, No. 12 (grade 3), 12.75c. a lb., average for week.
Nickel electrolytic cathode, 35c. a lb.; shot and ingot, remelt electro, 36c. a lb.
Antimony, 7.75c. a lb. Quicksilver, per flask of 76 lb., $75.
Brass ingots, 85-5-5-5, 8.75c. a lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	53.00c. to 54.00c.
Tin, bar	55.00c. to 56.00c.
Copper, Lake	10.25c. to 11.00c.
Copper, electrolytic	10.00c. to 10.50c.
Copper, castings	9.75c. to 10.75c.
*Copper sheets, hot-rolled	16.00c.
*High brass sheets	14.50c.
*Seamless brass tubes	17.00c.
*Seamless copper tubes	17.25c.
*Brass rods	13.00c.
Zinc, slabs	5.75c. to 6.75c.
Zinc sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.50c. to 5.50c.
Lead, bar	5.50c. to 6.50c.
Lead, sheets	7.50c.
Antimony, Asiatic	9.75c
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	32.50c. to 33.50c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	55.25c.
Tin, bar	57.25c.
Copper, Lake	10.00c.
Copper, electrolytic	10.00c.
Copper, castings	9.75c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	4.75c. to 5.00c.
Lead, bar	7.75c.
Antimony, Asiatic	9.00c.
Babbitt metal, medium grade	18.50c.
Babbitt metal, high grade	59.25c.
Solder, ½ and ½	33.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.62½c.	7.37½c.
Copper, hvy. and wire	6.37½c.	7.12½c.
Copper, light and bottoms	5.37½c.	6.37½c.
Brass, heavy	3.37½c.	4.00c.
Brass, light	3.00c.	3.62½c.
Hvy. machine composition	5.12½c.	6.00c.
No. 1 yel. brass turnings	4.50c.	5.25c.
No. 1 red brass or compos. turnings	4.37½c.	5.37½c.
Lead, heavy	3.00c.	3.50c.
Zinc	2.25c.	3.00c.
Cast aluminum	9.62½c.	10.75c.
Sheet aluminum	11.00c.	12.50c.

Reinforcing Steel

Awards 2900 Tons—New Projects 2225 Tons

Boston, 250 tons, section 13, Stoney Brook sewer, to Concrete Steel Co.

Dover, N. H., 250 tons, bridge, to an unnamed bidder.

Tewksbury, Mass., 120 tons, State hospital dining hall and kitchen, to Kalman Steel Corpn.

State of Illinois, 300 tons, highway and bridge work, to Calumet Steel Co.

Maywood, Ill., 115 tons, reservoir, to Concrete Engineering Co.

Lake Forest, Ill., 100 tons, high school.

Chicago, 800 tons, sewer project No. 9 for sanitary district, to Concrete Engineering Co.

Chicago, 350 tons, project No. 10 for Sanitary District, to Inland Steel Co.

Bettendorf, Iowa, 400 tons, superstructure for Mississippi River bridge, to Kalman Steel Corpn.

Los Angeles County, Cal., 190 tons, material for Verduga Wash, to Blue Diamond Corpn.

Los Angeles, 135 tons, chemistry building at University of California, to Soule Steel Co.

NEW REINFORCING BAR PROJECTS

State of Illinois, 100 tons, bridge work; bids taken July 3 by State highway commission.

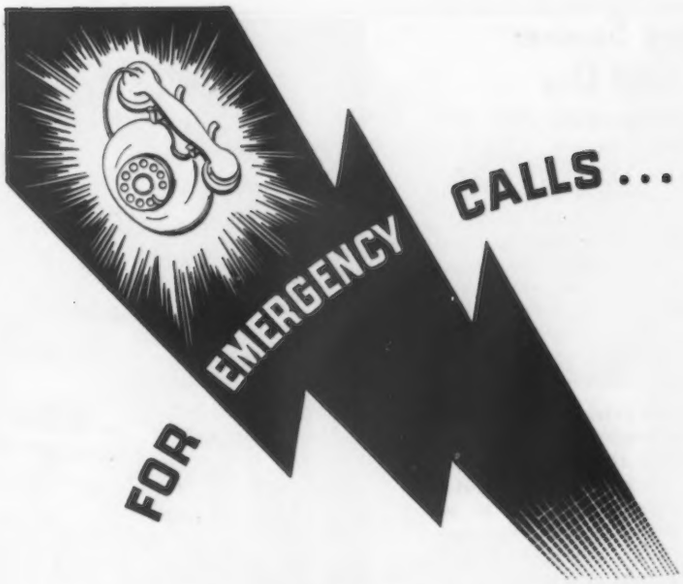
Stockton, Cal., 1500 tons, city wharf and transit shed; bids July 17.

Kern County, Cal., 160 tons, State paving near Fort Tejon; bids July 25.

Los Angeles County, Cal., 150 tons, bridge over Alhambra Wash; general contract awarded.

Long Beach, Cal., 100 tons, English building at Junior College; bids under advisement.

Los Angeles, 100 tons, mausoleum; bids under advisement.



S.O.S. WYCKOFF

"WYCKOFF *for accuracy, uniformity, dependability"*

When you have an emergency order which you must have in record time—telephone or telegraph **WYCKOFF** and your order will be dispatched with telegraphic promptness. Complete mill stocks at both Pittsburgh and Chicago assure you immediate service, in any quantity as your requirements demand. Let **WYCKOFF** serve you during 1934.

WYCKOFF DRAWN STEEL COMPANY

General Offices: Ambridge, Pa.
Mills at Ambridge, Pa. and Chicago, Ill.
Manufacturers of
Cold Drawn Steels
Turned and Polished Shafting — Turned and Ground Shafting

Output Well Sustained In Birmingham Area

BIRMINGHAM, July 10.—The arrival of the third quarter brought an abrupt change in the pig iron situation. All through June there was a steady and heavy movement of pig iron, bought at the lower prices prevailing in early April. Most foundries took all they could carry and are now amply stocked for sometime to come. The past week was quiet, with little new business and light shipments. As a considerable part of the iron shipped on second quarter contracts has been stocked the outlook for July is dull.

No changes have yet been made in furnace operations but later in the month there may be a tapering off. Ten furnaces are still active. The base price of $14.50 is also unchanged.

Pipe plants are looking forward to numerous bid openings, but releases are not expected to follow soon. June was a good month from the standpoint of bid openings but various tonnages have been held up.

Steel

Birmingham price reductions ranging from $1 to $4 a ton on various steel products have been made. No. 10 hot rolled sheets have been reduced $3 to 2.00c.; No. 24 hot rolled annealed, $4 to 2.60c.; No. 14 galvanized, $3 to 3.25c.; bars, $2 to 1.95c.; plates and shapes, $1 to 1.95c.; hot rolled strip, $3 to 2.00c. No changes have been made in wire products.

Open-hearth operations last week consisted of 12 active units, with the exception of the holiday when part of that number were closed down. Eleven units are scheduled for this week. Open-hearth operations will probably be reduced in the near future.

Gulf, Mobile & Northern railroad has been granted a loan of about $450,000 for track improvements and it is expected that this tonnage will be placed in Birmingham, although as yet no official announcement has been made.

Backwashing Strainer For Steel Mill Use

FREYN ENGINEERING CO., 310 South Michigan Avenue, Chicago, has produced a new backwashing strainer which is cleaned while in operation without removing the baskets. It is known as the Phillips strainer and is adapted for cleaning the water used for general service requirements around the steel mill and power plant. It may also be used for removing scale and slag from discharge water of rolling mills and blast furnaces.

The strainer comprises two baskets placed at 90 deg. angles to each other, and through which the flow of water is controlled by two swinging gate valves. The strainer basket is a cylinder, perforated to give the desired screen opening, the top and bottom of the basket being open.

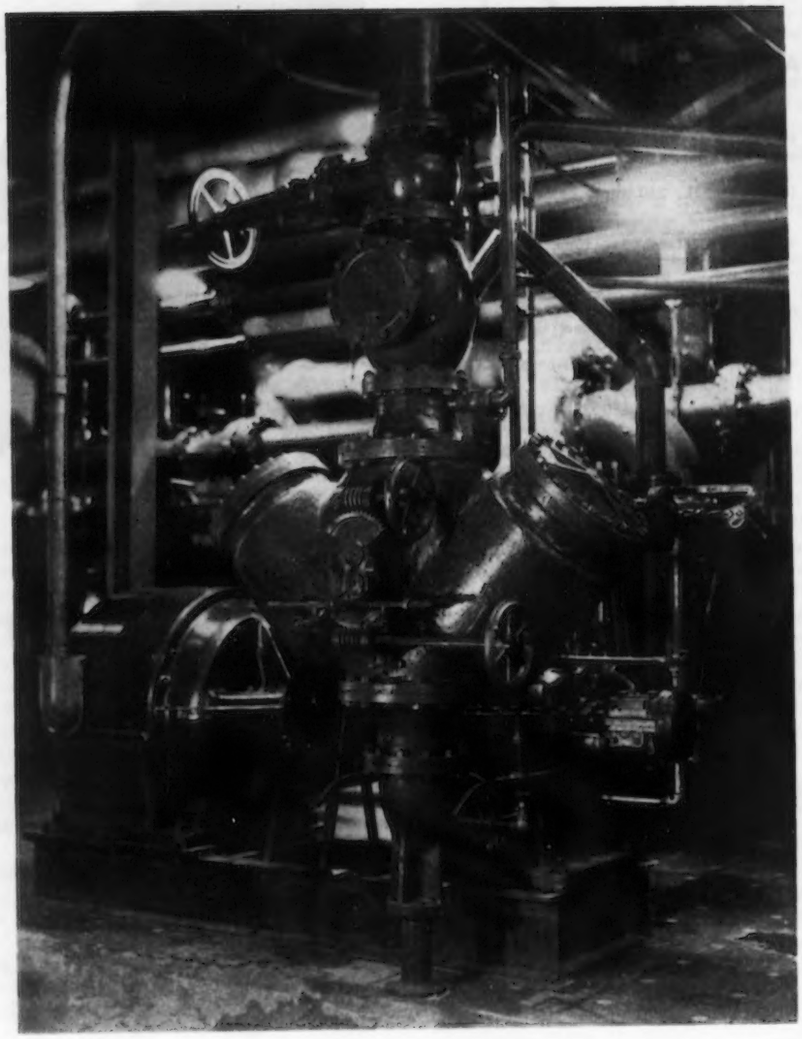
Under normal operation both gate valves are in the position shown in the drawing. Water enters at the bottom as shown and divides, half passing through each strainer basket. To clean one of the baskets the bottom gate valve is closed, cutting off the inlet water to that basket. The by-pass valve on that basket is then opened, with the result that clean water from the discharge of the other strainer basket is forced through the first mentioned strainer basket in the reverse direction, flushing the dirt out of the baskets and through the by-pass valve. The by-pass valve is then closed and the gate opened.

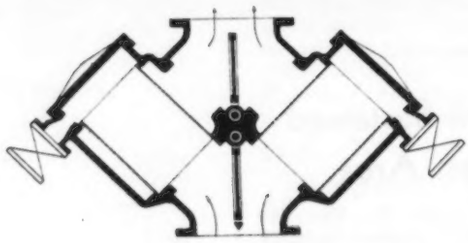
To remove a strainer basket for inspection, both gate valves are closed, whereupon the basket may be removed the same as with the conventional type of twin basket strainer.

The frequency of backwashing is determined by the amount of foreign matter in the water being strained. At an installation in a large generating plant in Chicago, on the discharge of a 4000 g.p.m. service water pump, pumpnig from Lake Michigan, it was found necessary to backwash the strainer only once every 8 hr. Inspection made at monthly intervals disclosed the strainer baskets to be perfectly clean.

The swinging gate valves consist of a bronze disk, which is held against the bronze seat by the line pressure of the water. The disk is carried on a stainless steel shaft which is held in live rubber bushings with the result that the shaft is free to shift its center to allow the swinging gate to seat perfectly.

The strainer baskets are made of brass with bronze rings at top and bottom. The baskets are provided with ⅛ in. to ⅜ in. or larger perforations as desired. The straining area in the baskets is considerably in excess of the area of the inlet. The strainer housing is made of cast iron for water pressures below 125 lb. per sq. in. and in cast steel up to pressures of 200 lb. per sq. in. The strainer may be mounted in any position: horizontal, vertical, on its side, or upside down.





No Shatter Cracks in Slowly Cooled Rails

THE effect on steel rails of slow controlled cooling after rolling was reported on briefly in a technical news bulletin of the National Bureau of Standards, as follows:

Residual stress measurements have been completed on 8-in. lengths from each of two rails from the same ingot, one cooled normally after rolling and the other cooled slowly through the blue heat temperature range by a recently developed industrial process. Six longitudinal specimens, ½-in. square in cross section, were cut from the head, web, and base of each of the 8-in. pieces. The bars from the center of the head of the normally cooled rail increased in length when isolated from the head, whereas similar bars from the slowly cooled rail decreased in length. The head of the normally cooled rail contained numerous shatter cracks, but the slowly cooled rail was free from shatter.

The results are interpreted as indicating that tensile stresses are normally produced in the central part of the head of a rail as it cools, and that in the shattered rail these stresses were relieved when the shatter cracks formed.

Seasonal Drop Less Severe at Cincinnati

CINCINNATI, July 10.—Bookings of district pig iron representatives were light in the past week, total business not having exceeded 300 tons. Melters are unwilling to make commitments for midsummer use and are following usual seasonal precedent. With virtually all second quarter contracts completed before July 1, shipments of iron have also dwindled. Furnace representatives indicate that the number of contracts rewritten is very small, the total being only about 1500 tons. Foundries have curtailed operations noticeably in keeping with reduced demand. The general market feeling, however, is optimistic and although criticism of code conditions is frequent, sentiment is not unduly antagonistic.

Steel

Sheet bookings have tapered further under the influence of a holiday week. Daily demand, however, is holding to a better proportion than is customary during the usual summer recession. While bookings normally recede as much as 50 to 60 per cent in July and August, the recession this year is about 35 per cent. Production in the past week was less than 25 per cent while advance schedules for this week indicate the same production rate. Recent reductions in prices, while without sufficient time test, have not stimulated new business as was hoped.

Coke

The holiday influence and the seasonal tapering of foundry coke specifications has cast a dull aspect over the market. Shipments are lighter and new business is nil.

Scrap

Mill inactivity is reflected in a further decline of scrap shipments. Current movement of old materials is light and necessary, while trading is negligible. Dealers' bids are unchanged and published schedules are nominal.

A 2200 ton Hydraulic Press designed and built for dependable service by Lake Erie Engineers

LAKE ERIE ENGINEERING CORP.

68 Kenmore Station, BUFFALO, N. Y.

We design and build Hydraulic Presses and Accumulators, Valves and Fittings, Plate Working Machinery, Special Machinery, Punches and Shears, Bending Rolls, Plate Planers, Rolled Steel Steam Plates, Railroad Scale Test Cars, Sugar Machinery.

Cast Iron Pipe

Stowe, Vt., closed bids July 12 on 24,000 ft. of pipe, gate valves, etc.

Tarboro, N. C., asks bids until July 20 for pipe and special castings for water system; also for pumping plant. William C. Olsen, Raleigh, N. C., is consulting engineer.

Blackwell, Okla., has authorized about 31,700 ft. 12-in. for trunk line service for water system. Bond issue of $56,000 has been voted. C. C. Stoldt is engineer.

Dos Palos Water District, Dos Palos, Cal., James Barton, director, plans pipe line for water supply. Bond issue of $25,000 is being arranged.

Vincent, Ala., plans water pipe line system; also pumping plant and elevated steel storage tank and tower. Fund of $28,000 has been secured through Federal aid.

Louisville, Colo., will take bids at once for 7200 ft. of 8-in. for new pipe line from water filter plant to town. Burton Lowther, Colorado Building, Denver, is consulting engineer.

Wentzville, Mo., will soon take bids for water pipe line system. Fund of $45,000 has been arranged for this and waterworks station. Russell & Axon, 4903 Delmar Boulevard, St. Louis, are consulting engineers.

Fairhope, Ala., plans water pipe line system; also elevated steel tank and tower and reservoir. Fund of $120,000 has been arranged.

Michigan City, Ind., will soon take bids for pipe for water system extensions; also for 500,000-gal. elevated steel tank and tower. 100,000-gal. wash water tank, pumping machinery, etc., for waterworks. Fund of $300,000 has been arranged. Pearse, Greeley & Hansen, 6 North Michigan Avenue, Chicago, are consulting engineers.

Marion, Wis., plans water pipe line system. Fund of $62,000 has been secured through Federal aid. A. E. McMahon Engineering Co., Menasha, Wis., is consulting engineer.

Marathon, Wis., closes bids July 13 on 8881 lin. ft. of 6-in., and 1530 lin. ft. of 8-in. class 150 Universal or Transite pipe and 26 hydrants.

Goshen, Ind., took contractors' bids July 2 on 400 tons of 8 to 12-in.

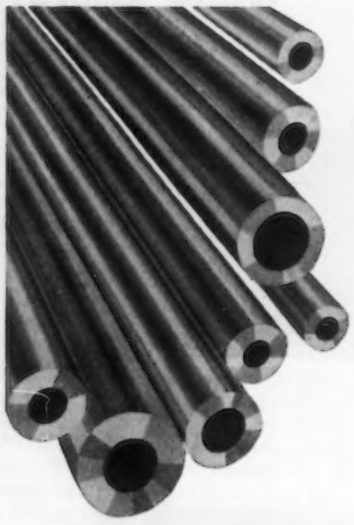
Arlington Heights, Ill., took revised bids July 2 on 200 tons.

Fallon, Nev., will take bids July 17 on 430 tons of 4 to 10-in.

Santa Monica, Cal., has awarded 148 tons of 4 and 6-in. to American Cast Iron Pipe Co.

Auburn, Cal., has rejected bids on 4500 ft. of 4 to 8-in.

Tonasket, Wash., has taken bids on 185 tons of 4 to 8-in. with alternate bids on steel.



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NON-SHRINK
OIL HARDENING
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for RING DIES
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SPACERS, BUSHINGS, Etc.

Manufacturers of BISCO Tungsten Carbide drawing dies for wire, rod and tubing.

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945 E. 67th ST. CLEVELAND, OHIO
Cincinnati Worcester Buffalo

OBITUARY

HENRY E. EBERHARDT, president of the Newark Gear Cutting Machine Co., and for more than 55 years prominently identified with the gear making and machine tool industries, died June 30 at the home of his daughter, Mrs. Edward Van Egri, Newark, N. J., in his 83rd year.

Born in Newark, he attended the public schools of that city, and in 1866, when 14, he entered the employ of Ezra Gould. At first he worked in the firm's New York office and then at the plant in Newark where he advanced rapidly, becoming a foreman while still an apprentice. After completing his apprenticeship he became a true journeyman, pursuing his trade in Philadelphia, Pittsburgh and Cleveland, finally returning to the Ezra Gould plant. Later, with his elder brother, Ulrich, he was taken into the partnership known as E. Gould & Eberhardt, and while a member of that firm developed the automatic gear cutting machine, plate press machine for printing Government bank notes, and many other mechanical devices, such as the arrangement of gearing which made speeds and feeds independent of each other. In 1904, he sold his interests in the company and with his sons established the firm of Eberhardt Brothers, later known as the Newark Gear Cutting Machine Co.

Although noted for devotion to his work, Mr. Eberhardt had many humanitarian and other interests. He was a talented musician, and a collector of rare old books on engineering subjects. In subjects outside of his engineering specialties, he kept abreast, if not a little ahead, of his time in many new developments; he acquired one of the first high-powered "magic lanterns," and color photography cameras, and his interest in automobiles dated back to 1901 or before, when he drove his first car, a Columbia Electric.

Mr. Eberhardt's service as director of the American Gear Manufacturer's Association, in which he was held in very high esteem because of his active interest and wise and kindly counsel, his service as director of the Chamber of Commerce of the United States, and his activities in other societies were outlined in connection with the celebration of his 80th birthday, reported in THE IRON AGE of Feb. 18, 1932. He is survived by his daughter, four sons, 12 grandchildren and two great grandchildren. Three of his sons, Henry J., Frank E., and U. Seth Eberhardt, are officials of the Newark Gear Cutting Machine Co., and one, Fred Ross Eberhardt, is proprietor of a machine building plant at Denver, Colo.

H. E. EBERHARDT

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ARTHUR THATCHER, a founder of the American Zinc Institute and a notable mining engineer who had been associated with various lead and zinc enterprises in Missouri from 1891 until his retirement four years ago, died of a heart attack at his home in St. Louis on July 2. He was born in Newtonville, Mass., 77 years ago. After graduation from the Columbia University School of Mines in 1877, he had mining experiences in Nevada, California and Arizona. He returned to New York after several years and engaged in consulting work, and then went to a mining camp in Idaho. Washington University, St. Louis, made Mr. Thatcher an assistant professor and later adjunct professor of mining and metallurgy, serving until the department was abolished in 1891. From 1892 to 1905, Mr. Thatcher was president and general manager of the Central Lead Co.; in 1906 he became consulting engineer for the American Smelting Co. In the same year he was appointed western manager of the New Jersey Zinc Co. He had been engaged in consulting practice in recent years until his retirement.

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W. J. SIMANEK, founder and president, Racine Pattern Works, Racine, Wis., died July 5, aged 52 years. Before establishing his own business in May, 1913, he served as superintendent of the pattern shops of the J. I. Case Co. and the former Mitchell Motor Car Co. in Racine.

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THANE R. BROWN, civil engineer, Wisconsin Bridge & Iron Co., Milwaukee, for 37 years, died June 30, aged 64 years. He was a graduate of the College of Engineering, University of Wisconsin, and was long a member of the American Society of Civil Engineers.

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CHARLES S. REDFIELD, president of the advertising firm of Redfield-Coupe, Inc., 247 Park Avenue, New York, and for many years advertising manager of the Yale & Towne Mfg. Co., Philadelphia, died July 8, at his summer home at Allenhurst, N. J., aged 65 years.

Railroad Equipment

Carnegie Steel Co. has awarded Greenville Steel Car Co. contract for repairing 13 steel hopper cars.

Pennsylvania has ordered 1000 cast steel one-piece underframes for 70-ton flat car from General Steel Castings Corpn.

Minnesota Transfer Railway is in the market for three locomotives.

Letters to the Editor

(Concluded from Page 32)

the welds are what they should be, and he knows that a bad weld is just as dangerous as the original defect. His past experiences have demonstrated that steel castings are entirely trustworthy in the large majority of cases and he insures such trustworthiness by insisting upon homogeneous conditions.

Large Variety of Steels for Castings

Development of welding and the active publicity relating to this newer process have obscured appreciation of the enormously wide range of alloy steels from which the engineer may now choose, and the wonderful response of these to scientific heat treatment.

Some 70 different compositions of steel are now available in casting form, and from practically all of them a range of physical properties is obtainable as the result of special heat treatment. Heat treatment and the highly beneficial results arising from its correct application are now understood thoroughly by steel foundrymen, much to the advantage of their product.

Technical literature published by the various branches of the metal casting industry over the past 10 years or so contains innumerable pleas to the engineer to consider foundry exigencies in designing. Many cases of such consideration are not lacking, of course, but on the whole it still seems generally believed that if a part is to be made as a casting, anything can be stuck on to it without detriment. Also, that its general shape, distribution of thickness and so on, are just a matter of foundry skill, regardless of how completely such shape and metal distribution may outrage the natural laws governing the solidification of cast metal.

Advantages From Considering Foundry Exigencies in Designing

It appears to the foundryman that it has been significantly easy to obtain from engineers radical changes of design where the part is to be fabricated by welding. As a foundryman, he is accustomed to having his pleas for design changes met either by the suggestion that if he doesn't care to make the part some one else will; or perhaps the plea has met a more favorable response in the form of a concession in the way of some trivial enlarging of a fillet or a tapering of some too-radical change of sectional thickness. He can surely be excused for being somewhat astonished to find parts for similar purposes acceptably fabricated through an altogether radically changed shape, and often simplified beyond recognition.

Without prejudice, but without hesitation, I would state that 75 per cent of casting designs could be modified, with at least equal efficiency to the engineer, in such a manner as to assure the following advantages: Lower production cost; lower pattern cost; quicker delivery; and removal of considerable hazard in production, thus eliminating defects usually discovered later in machining.

Such castings would be designed not only by the application of mathematical engineering, but also in the light of present metallurgical knowledge of the behavior of solidifying metal—of which knowledge there exists a plentitude going to waste.

A foundryman's job has become largely the seeking for artificial means to confound the established laws of nature governing solidification; the extent to which this hazardous game of hide and seek is imposed upon him by indiscriminate design, just because the part is a casting, is the controlling feature of the degree of success forthcoming.

Forgings and stampings are many times difficult to produce, and it is not at all uncommon to have to frankly admit that without change of design these methods of manufacture are impossible. In a casting, however, in any metal, it is still largely a matter of custom to leave it to the foundry to devise means. From this has risen 90 per cent of the foundryman's grief.

In looking back, any foundryman can point to items produced in thousands at a cost that would defy competition, with insignificant foundry losses, and with perfect service behavior. Study of such jobs indicates immediately a knowing arrangement of shapes or proper distribution of metal, a design sympathetically adjusted to the vagaries of the sand mold; and the result justifies the agitation of gray matter at the right time, namely, while designing at the board.

It is my belief that the same considerate mental attitude toward casting design, especially as to the facts of metal solidification, would result in cost savings and in a quality of casting that would in overlapping applications meet the challenge of fabrication by welding.

FREDERICK A. MELMOTH,
Vice-President, Detroit Steel Casting Co.

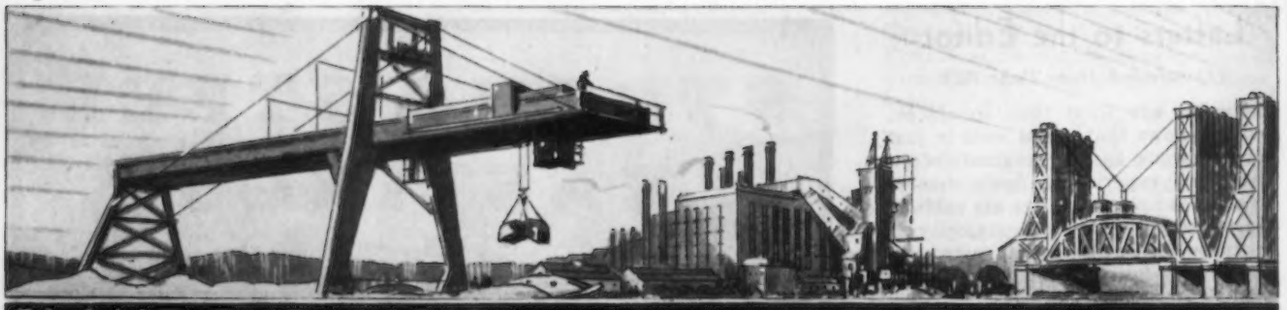
June 15, 1934.

Republic Steel Severs Union Contract

REPUBLIC STEEL CORPN. has severed its relations with the Amalgamated Association of Iron, Steel and Tin Workers in the Warren, Ohio, district.

The plants in the district had dealt with the Amalgamated for a number of years prior to the organization of the Republic Corpn., and the relations in this particular district had continued in effect up to this Tuesday.

The move on the part of the corporation was "because of the danger that the management of the Amalgamated may pass into the hands of the radical element."



PLANT EXPANSION AND EQUIPMENT BUYING

Automotive Tool Purchases Begin With $800,000 Order—Business Sustained

THE placing of orders for machine tools and kindred equipment, amounting to $800,000, by a large automobile company in the past week was the only outstanding development. This is believed to be the forerunner of heavier buying from this source. Business generally is holding up fairly well, with machine tool builders in all principal districts reporting a fair volume of inquiry and awards since the first of the month. Purchases are usually for the immediate needs of buyers who do not seem to be going ahead with extensive retooling programs.

Export business is holding up, although orders from Russia have been indefinitely postponed by the interpretation of the Johnson Act. It is estimated that about $12,000,000 worth of purchases by Russia in this country were in prospect, but may now be placed elsewhere.

NORTH ATLANTIC

Board of Transportation, 250 Hudson Street, New York, asks bids until July 17 for rail ties, etc., for municipal subway system; until July 20 for new car inspection shed, service and shop buildings at Jamaica, L. I., and bolts, nuts, washers, spikes, track rails, joint bars, tie plates, insulators and other equipment; until July 24, power equipment for Houston-Essex-Rutgers Street line, Manhattan. This is part of municipal subway program for which city has secured a Federal loan of $23,160,000. John H. Delaney is chairman of board.

Superintendent of Lighthouses, St. George, Staten Island, New York, asks bids until July 30 for lamp changers, lantern parts, etc. (Proposal 46658).

Scott National Welded Products Corpn., Long Island City, has been organized by David S. Meyer, 41 Blake Avenue, Brooklyn, and associates, to manufacture welded steel and other metal products.

Continental Can Co., 1 Pershing Square, New York, has approved plans for one-story addition to branch plant at Wheeling, W. Va. Cost over $40,000 with equipment.

Standard Oil Co. of New York, 26 Broadway, New York, has plans for one-story bulk oil storage and distributing plant, 60 x 116 ft., at Elmira, N. Y. Cost over $50,000 with tanks and equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 24 for 16 forced draft blowers and spare parts for Brooklyn and Philadelphia Navy Yards (Schedule 2875).

Board of Education, Utica, N. Y., will soon take bids on general contract for first unit of new senior high school on Tilden Avenue, to include manual training department. Cost about $300,000. Other units will be built later, with ultimate cost of about $850,000. Bagg & Newkirk, Utica Gas & Electric Building, are architects.

Superheater Co., 60 East Forty-second Street, New York, manufacturer of superheaters and parts, air preheaters and other power equipment, plans expansion at plant of Heine Boiler Co., 5319 Shreve Avenue, St. Louis, manufacturer of water tube boilers, recently acquired at foreclosure sale.

Safety Pilot Valve Co., Inc., Kingston, N. Y., has been organized by James F. and James A. Dwyer, 70 West Chestnut Street and 39 West Chestnut Street respectively, both Kingston, to manufacture safety valves and kindred engineering products.

Department of Sanitation, Municipal Building, New York, plans new refuse incinerator plant on West Fifty-ninth Street, near Eleventh Avenue. Cost over $750,000 with equipment. Two other such works are also planned in different parts of city. Funds are being secured through PWA loan. Plans are under consideration for installation of electric power plant in conjunction with new incinerator station at Ninth Avenue and 215th Street, recently completed, to cost about $250,000 with generator units and accessories. W. E. Sneed is construction superintendent.

Texas Co., 135 East Forty-second Street, New York, has authorized erection of bulk oil storage and distribution plants in Alberta and Saskatchewan, Canada, work to be carried out by Texas Co. of Canada, Ltd., a subsidiary. Cost about $300,000 with tanks and equipment.

Hall-Watson Co., Inc., New York, has been organized by George W. Watson, 253 Cumberland Street, Brooklyn, and Ralph S. Hall, 126 Bella Vista Street, Tuckahoe, N. Y., to manufacture steel and other metal products.

Bendix Corpn., 105 West Adams Street, Chicago, operating Bendix Aviation Corpn., same address, and Bendix Brake Co., South Bend, Ind., manufacturer of airplane accessories, automotive equipment, etc., is negotiating with City Commission, Newark, N. J., for lease of about 30 acres at Port Newark, for new Eastern branch plant, to cost about $750,000 with equipment; also for option to lease an adjoining tract for other plant units later, to cost close to like sum. Frank Grad, 1172 Raymond Boulevard, Newark, is architect and local representative for company in realty transaction.

Volco Wire Co., 100 Bleecker Street, New York, manufacturer of wire and wire goods, has acquired at public sale former plant of Wright Chemical Co., Kenilworth, N. J., on site 100 x 200 ft., and will remodel for new plant.

Board of Education, Reading, Pa., plans manual training department in new multi-story high school, 360 x 460 ft., for which bids have been asked on general contract. Cost $1,500,000. Associated Architects, Inc., 147 North Fifth Street, is architect.

City Council, Seaford, Del., is considering new municipal electric light and power plant and distribution system, for which Frank J. Glueck, Commercial Trust Building, Philadelphia, engineer, has submitted estimate of cost of $175,000, including equipment.

NEW ENGLAND

Village Gas & Electric Department, Occum, Conn., has approved plans for new municipal hydroelectric power plant. Cost about $60,000 with equipment. Chandler & Palmer, New London, Conn., are architects.

Colonial Beacon Oil Co., 30 Beacham Street, Everett, Boston, plans new bulk oil storage and distributing plant at Newburyport, Mass. Cost about $50,000 with steel tanks, pumping equipment, etc.

Essex Ferrule Co., Swampscott, Mass., has been organized by Hamilton G. Pretat and Richard Ward, Jr., Tupelo Road, Swampscott, to manufacture steel ferrules and kindred equipment.

Board of Selectmen, Ipswich, Mass., plans manual training department in new two-story senior high school. Cost about $200,000. Bids will soon be asked on general contract. J. William Beal Sons, 185 Devonshire Street, Boston, are architects. Dr. Ernest J. Smith is chairman of building commission, in charge.

State Armory Commission, Room 259, State House, Boston, will soon begin erection of one-story storage and distributing building for artillery transportation equipment, etc., at Natick, Mass. Cost $114,000 with equipment. Federal financing has been arranged. J. Theodore Whitney, 100 Arlington Street, Boston, is engineer.

Draper Corpn., Hopedale, Mass., is making alterations to its erecting shop at cost of $500,000.

SOUTHWEST

McCormick Mercantile & Distillery Co., Waldron, Mo., S. McCormick, president, has plans for new two-story distilling plant. Cost about $50,000 with equipment.

United States Engineer Office, Kansas City, Mo., asks bids until July 16 for 800 single pole cable connectors (Circular 194); until July 18, food choppers, ice picks, strainers, stock pots and kindred equipment (Circular 193); until July 19, 12 portable cable terminal structures, with jumper cables, live line equipment, etc. (Circular 191).

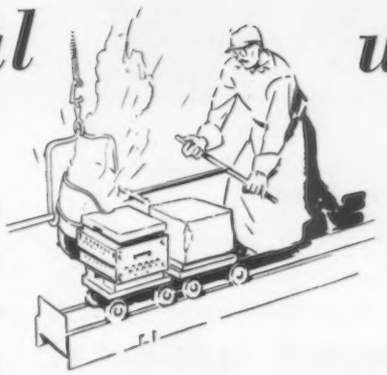
City Council, Osceola, Ark., plans extensions and improvements in municipal electric light and power plant, with installation of new Diesel engine-generating unit and accessory equipment. Fund of $52,000 has been arranged.

Common Council, Mansfield, Ark., plans installation of pumping machinery and auxiliary equipment, pipe lines, etc., for new municipal

Crane Metal Control

insures uniform operation

...in general utility valves



A metal run *must* be analyzed and approved by Crane laboratories before even the rough castings of Crane general utility valves are finished. Frequent test bars are poured . . . the *quality* of the metal checked for endurance, strength, *wear*-ability.

This *extra* care in manufacture means only one thing: Crane general utility valves will *last* . . . outlast the ordinary cheap valve two to one . . . show far less wear . . . end the nuisance of leaky valves and interrupted service in low pressure lines.

Even the dimensions on these valves are checked by one of the most complete gauging systems in the world. Vital parts of the valves are generously proportioned . . . given added *metal reserve* . . . extra *strength* at no extra *cost* to you!

Sum this up: it will pay you to order Crane general utility valves if only on the score of more satisfactory service in your lines . . . to say nothing of the lengthened span of life!

Crane Brass Gate Valve . . . when opened, the disc lifts entirely clear of the port opening

Crane Brass Check Valve . . . evolved from metals unusually lasting in constant service

Crane Brass Globe or Angle Valves . . . given extra metal at vital points to prevent distortion and leaking

CRANE

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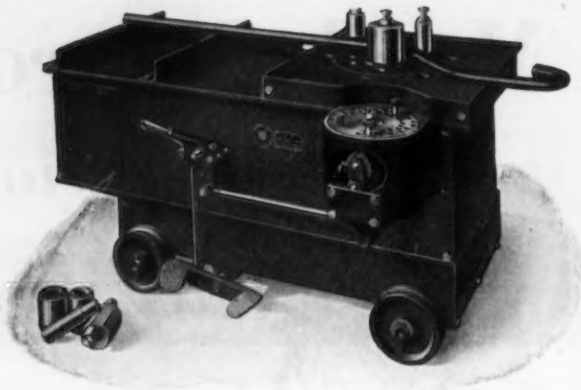
Branches and Sales Offices in One Hundred and Sixty Cities

AUTOMATIC MOTOR DRIVEN BAR BENDING MACHINE

"Perfect"



Bends Hooks, Angles, Stirrups, Spirals, Rings, Straightens bars, etc.

Bends two angles in one operation and bends a number of bars simultaneously.

All bendings automatically controlled.

RESULTS: Speed—Uniformity of Product—Economy.

Write for descriptive Bulletin.

G. D. S. SHEARING & PUNCHING MACHINE CO.

101 Walker St., New York City

waterworks. Fund of $56,000 has been arranged.

Common Council, Kennett, Mo., plans call for bids in August for new municipal electric light and power plant, using Diesel engine-generating units and electrical distribution system. Cost about $165,000 with equipment. Financing has been arranged. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

City Council, San Benito, Tex., has plans for new municipal airport, including three hangars, repair shops, oil storage and distributing building and other units. Cost over $60,000 with equipment. Vermilya-Huffman Flying Service, Lunken Airport, Cincinnati, Ohio, is interested in project.

Dallas Brewery, Inc., Dallas, Tex., has let general contract to W. H. King, Construction Building, for five-story addition and improvements in present plant. Cost about $100,000 with equipment.

BUFFALO DISTRICT

Beech Nut Packing Co., Canajoharie, N. Y., food products, has approved plans for addition to branch canning plant at Rochester, N. Y. Cost over $200,000 with equipment.

Milk Products Machinery Corpn., Buffalo, has been organized by Joseph P. Shea, 101 Parkside Avenue, and associates, to manufacture dairy and farm machinery and parts.

Linde Air Products Co., 1811 Broadway, Buffalo, manufacturer of oxyacetylene welding equipment, etc., has filed plans for one-story machine shop at 155 Chandler Street. Cost about $25,000 with equipment. Headquarters are in New York.

United Motors Co., Ltd., Toronto, Ont., plans rebuilding part of plant recently destroyed by fire. Loss about $75,000 with equipment.

SOUTH ATLANTIC

City Council, Fayetteville, N. C., is completing plans for new docks and terminal buildings on Cape Fear River, with elevating, conveying and other mechanical-handling equipment, and for extensions and improvements in electrical system. Fund of $122,000 has been arranged for work. Walter F. Schulz, Shrine Building, Memphis, Tenn., is consulting engineer.

Atlas Foundry Co., Charlotte, N. C., has been organized by L. J. Nolen and E. Frohman, 1361 East Morehead Street, and associates, to manufacture metal castings.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until July 25 for boiler plant and oil storage system at Naval Air Station, Pensacola, Fla. (Specification 7676).

Carolina Aniline & Extract Co., 1122 South Boulevard, Charlotte, N. C., G. S. McCarty, president, recently organized, has plans for one-story plant for manufacture of refined oil products, waxes, oil compounds, etc., with installation of collodial mills, tanks, kettles and other equipment. Cost close to $25,000 with machinery.

OHIO AND INDIANA

Lindsay Wire Weaving Co., 14025 Aspinwall Avenue, Cleveland, manufacturer of wire cloth, etc., has awarded general contract to J. C. Shafer Co., Smythe Building, for one-story addition, 60 x 97 ft. Cost about $25,000 with equipment. William A. Bohnard, 9815 Newton Avenue, is architect.

Rupp Forge & Shear Co., 1735 Winter Street, Cleveland, has plans for one-story addition, 50 x 75 ft., and soon asks bids on general contract.

Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until July 27 for 250,000 high-tension ignition cable and 125 reels (Circular 641).

Lubeck Brewing Co., 26 South Superior Street, Toledo, Ohio, has been acquired by new interests, headed by Arthur R. Lemmon, Akron, Ohio, and associates. Plans are under way for expansion, including additional equipment.

Durion Co., Dayton, Ohio, manufacturer of acid and alkali handling equipment, has started erection of extension to its alloy steel foundry which doubles size of present plant. Additional electric induction furnaces will be installed for production of alloy steels and other chromium-nickel alloys.

Old Tavern Brewing Co., 1804 East Fifty-fifth Street, Cleveland, has let general contract to Jerry Gattozzi, 791 London Road, for one-story addition and improvements in present brewery. Cost about $30,000 with equipment. Raymond D. Parsons, Keith Building, is architect.

F-K Auto Trunk Corpn., 2122 Northwestern Avenue, Indianapolis, manufacturer of automobile trunks, metal frames, etc., plans rebuilding part of plant recently destroyed by fire. Loss about $50,000 with equipment.

Interstate Machine Tool & Engineering, Inc., Albany, Ind., has been organized by H. E. Humphreys and Lloyd W. Easter, Albany, to manufacture machinery and parts.

City Council, North Vernon, Ind., asks bids until July 20 for equipment for municipal waterworks, including pipe lines, etc. Charles Hurd, Architects' & Builders' Building, Indianapolis, is consulting engineer.

WASHINGTON DISTRICT

Virginia Airship Co., Richmond, Va., Garrette W. Peck, president, has leased about 900 acres near Byrd Airport for new plant for manufacture of aircraft and parts, including engines, etc., with division for production of new type dirigibles. Cost about $900,000 with equipment. Financing is being arranged.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Aug. 1 for buildings and equipment for Naval Radio Station, Summit, Canal Zone, including elevated steel water tank and tower, water system with pipe lines, etc., electrical system and other utilities (Specification 7515); also for bids (no closing date stated) for similar buildings at Naval Radio Station, Lualualei, T. H., including water system and pipe lines, electrical distributing system, etc. (Specification 7525).

Consolidated Beef & Provision Co., 100 South Exeter Street, Baltimore, meat packer, has let general contract to J. Henry Miller, Inc., Franklin and Eutaw Streets, for two additions, three-stories and four-stories and basement respectively. Cost about $85,000 with equipment. William F. Stone, Jr., 2612 North Charles Street, is architect; James Posey, Baltimore Trust Building, is consulting engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 17 for chain hoists (Schedule 2821), gasoline fire pots (Schedule 2837), corrosion-resisting steel castings (Schedule 2833), shovels (Schedule 2820), drums and headers (Schedule 2776), gasoline tanks (Schedule 2671), steel sockets for Morse taper shank tools (Schedule 2831), naval brass boat facings (Schedule 2838), portable electric drills and grinders (Schedule 2832), machinists' and pneumatic chisels, pneumatic chisel blanks, etc. (Schedule 2830), seamless steel tubing (Schedule 2868), all for Eastern and Western Navy Yards.

MICHIGAN DISTRICT

Superior Welding & Brazing Co., 6564 Russell Street, Detroit, has plans for one-story addition. Cost about $25,000 with equipment. Pollmar, Ropes & Lundy, 2539 Woodward Avenue, are architects.

General Conveyors Corpn., 1938 East Franklin Street, Detroit, has been organized by Erich A. Jastrow, 860 Nottingham Road, Grosse Pointe Park, to manufacture conveyor systems and kindred equipment.

Grand Trunk Railway System, 441 East Jefferson Street, Detroit, plans one-story addition to engine house and shop at Muskegon, Mich.

City Council, Morenci, Mich., has plans for new municipal electric light and power plant. Cost about $125,000 with equipment. Ayers, Lewis, Norris & May, Ann Arbor, Mich., are consulting engineers.

G. B. Purcell, Inc., 15120 Woodward Avenue, Highland Park, Mich., has been organized by G. B. Purcell, 646 Hazelwood Avenue, Detroit, and associates, to manufacture machinery and parts.

McGeary Screw Products Co., Detroit, recently organized by J. K. Williams, is operating at 2153 W. Warren Street. Additional equipment is being installed.

SOUTH CENTRAL

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until July 20 for eight sets high-pressure slide gates, each 5 ft. 8 in. x 10 ft., with frames, hoists, automatic and semi-automatic gate hangers, bolts, gaskets, etc., for Norris Dam; until July 19 (postponed from July 9), three 3333-kva., single phase, self-cooled, power transformers, and auxiliary equipment for electric power distribution. Plans are under way for power transmission line between Wilson and Norris Dams. Cost close to $2,000,000 with substations, switching stations and other structures.

Board of Aldermen, Magnolia, Miss., asks bids until July 16 for new pumping plant

MOLY

makes steel easier to weld

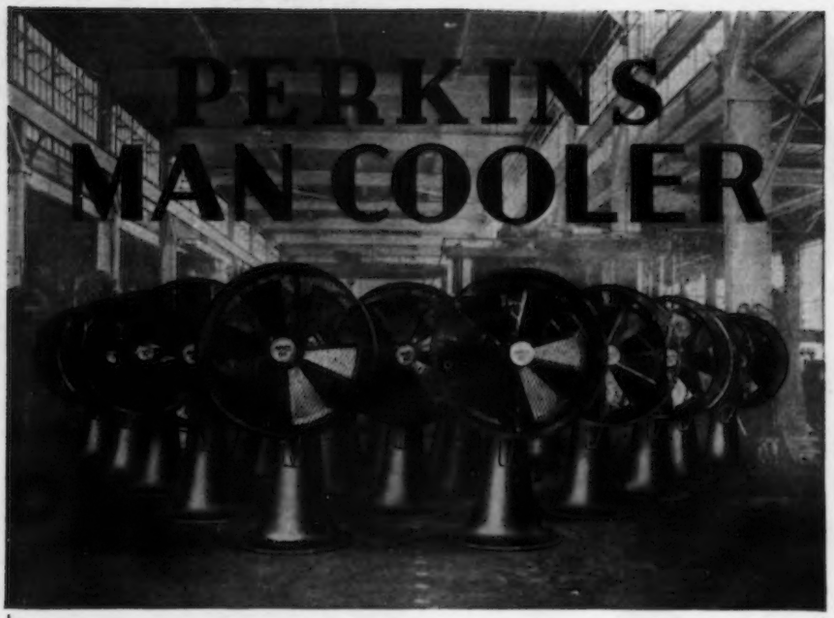
WITH welding rapidly replacing riveting, Molybdenum is being discussed more and more among those having welding problems. Today many concerns, both in the United States and abroad, are using either Molybdenum steel welding rods or welding rods coated with sufficient Molybdenum to produce an alloy steel in the weld . . . even to join plain carbon steel plates or shapes. The advantages of this practice are in the achievement of welds of higher strength and toughness than could be attained with a plain Carbon rod.

"Moly" is practically the only alloy usable in steel which does not in any way interfere with welding practice. The use of Carbon Molybdenum steel plate with a Molybdenum welding rod is the ideal combination for high-strength welded units.

The Climax Molybdenum Company has compiled much data on the strength of Molybdenum steel weld sheets. We shall be glad to give you the service of our metallurgists and our Detroit experimental laboratory to help you with your problems.

Moly always improves steel. It increases, among other properties, the ultimate strength, creep strength and resistance to wear. It produces a superior steel at a competitive initial price and often with a lower fabricating cost. Our latest publication on Molybdenum gives details. Write for it. Climax Molybdenum Co., 295 Madison Ave., New York City.

CLIMAX Mo-lyb-den-um



The constantly increasing demands for Perkins Man Coolers result from increased knowledge of the evils of excessive heat.

Perkins Man Coolers recirculate the air, refreshing your workers and maintaining normal body temperatures so essential to steady, maximum production.

Your comparatively small investment in *Perkins Man Coolers* quickly pays you dividends, to say nothing of your satisfaction in the increased comfort and good health of your men.

Made in stationary and oscillating types, readily portable.

B. F. PERKINS & SON, Inc.
ENGINEERS AND MANUFACTURERS
HOLYOKE, MASS.

for municipal water system, including Diesel oil engine with accessories, pumping machinery, etc. Henry A. Mentz & Co., Inc., Hammond, La., is consulting engineer.

City Council, Knoxville, Tenn., asks bids until July 17 for electrical distribution system in connection with use of power from hydroelectric power stations of Tennessee Valley Authority (Contract No. 1), meters and auxiliary equipment (Contract No. 2), transformers and accessories (Contract No. 3), and substation equipment (Contract No. 4). Cost about $600,000. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Standard Oil Co. of Louisiana, Inc., Baton Rouge, La., plans new bulk oil storage and distributing plant at Woodward, Tenn. Cost close to $40,000 with tanks and other equipment.

MIDDLE WEST

Purchasing Officer, Indian Warehouse, 1749 West Pershing Road, Chicago, asks bids until July 19 for wrenches, taps, vises, pipe reamers, anvils, augers, hammers, hatchets, drills, stovepipe collars, bolt clappers, log chains, spring calipers, gaskets, wire cloth, locks, knives, barbed wire, wheels for pipe cutters, pipe fittings, blacksmith blowers, animal shoes, tool steel, tool grinders, bits, bevels, saw blades, nippers, nuts, cutting punches, saws, rivets, rasps, screwdrivers and other tools and hardware supplies for fiscal year 1935 (Schedule 17).

Paul Gerhardt, Sr., 64 West Randolph Street, Chicago, architect, has plans for two distilling plants for company whose name is temporarily withheld, each with power house and machine shop. Cost over $150,000 each, including equipment.

National Automatic Safety Signal Co., 228 North La Salle Street, Chicago, has been organized by Joseph S. Berg and John E. Kieding, to manufacture safety signal devices and equipment.

Northern Pacific Railway Co., Railroad Building, St. Paul, Minn., has let general contract to Colonial Building Co., 326 First Street, Spokane, Wash., for one-story addition to engine house and shop at Missoula, Mont. Cost about $25,000 with equipment. O. M. Rognan, St. Paul, is company architect.

Village Council, Litchfield, Minn., asks bids until July 16 for motor-driven pumping machinery and auxiliary equipment for municipal water system. Charles Foster, Sellwood Building, Duluth, Minn., is consulting engineer.

Delco Tire Co., 1426 South Michigan Avenue, Chicago, has leased three-story and basement building at Michigan Avenue and Thirty-seventh Street, about 32,000 sq. ft. floor space, and will remodel for new storage and distributing plant.

Board of Education, Bismarck, N. D., plans manual training equipment in new two-story and basement high school, for which bids are being asked on general contract until July 20. Cost about $385,000. Financing has been arranged. Ritterbush Brothers, Bismarck, are architects.

X-Ring Products Co., 503 North Street, Peoria, Ill., has been organized by W. A. Hale, Peoria, and associates, to manufacture tools, parts and other mechanical equipment.

WESTERN PENNA.

Hammermill Paper Co., Erie, Pa., is considering new paper mill on Matane River, Matane, Que., including power dam. Cost over $150,000 with equipment.

City Council, New Cumberland, W. Va., asks bids until July 26 for equipment for extensions and improvements in municipal waterworks, including pipe lines, etc. J. Paul Blundon, Law Building, Keyser, W. Va., is consulting engineer.

Westinghouse Electric & Mfg. Co., East Pittsburgh, has plans for three-story addition to branch plant at Hamilton, Ont., operated in name of Canadian Westinghouse Co., Ltd. Cost about $90,000 with equipment. Prack & Prack, Pigott Building, Hamilton, are architects.

PACIFIC COAST

Firestone Tire & Rubber Co. of California, Firestone Boulevard, Los Angeles, has let general contract to Trewhitt Shields Co., Pacific Southwest Building, Fresno, Cal., for one-story factory branch, storage and distributing plant, 125 x 150 ft., at Fresno. Cost about $55,000 with equipment.

Hughes-Mitchell Processes, Inc., 618 Majestic Building, Denver, manufacturer of industrial chemicals, etc., has purchased a tract of land at Normandie Avenue and 190th Street, Torrance, near Los Angeles, as site for new branch plant. Cost over $70,000 with equipment.

United States Engineer Office, Portland, asks bids until July 18 for two hydraulic turbines with governor adjusted blades, one main turbine guide bearing shell lined with anti-friction metal; two control gates and stems, two gate stem levers, breaking elements for gate-operating mechanism, runner blade, one set gate stem bearing bushings, etc. (Circular 804).

Washington Wineries, Inc., Sumner, Wash., Robert J. Rayson, president, care of Mock & Morrison, Perkins Building, Tacoma, Wash., architects, will soon take bids on general contract for new three-story winery, 66 x 140 ft., with power house, refrigerating plant, machine shop and other units. Cost about $110,000 with equipment.

Standard Oil Co. of California, 225 Bush Street, San Francisco, has approved plans for extensions and improvements in refinery at Richmond, Cal., with steel towers, distillation machinery, furnaces for oil heating, still equipment, etc. Cost about $1,750,000. Contract for part of equipment has been let to M. W. Kellogg Co., 225 Broadway, New York.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 24 for corrosion-resisting steel angles and sheets (Schedule 2860), sheet and strip brass and copper (Schedule 2866), copper-nickel-alloy strip (Schedule 2867) for Mare Island Navy Yard.

Imperial Citrus Fruit Exchange, Brawley, Cal., plans rebuilding part of packing, storage and distribution plant recently destroyed by fire. Loss about $30,000 with mechanical-handling and other equipment.

FOREIGN

Heavy Industry Trust, Soviet Russian Government, Moscow, plans additions to heavy machinery and parts plant at Kramatorsk, Russia, to include new machine tools and other equipment. Cost over $1,000,000. Amtorg Trading Corpn., 261 Fifth Avenue, New York, is official buying agency.

Maybe your motors aren't buried in as much abrasive dust and dirt as this one — but this photograph demonstrates the stamina of F - M motors against adverse conditions.

A *history making* MOTOR IDEA!

"A motor is a *mechanical* device having electrical functions." Years ago, this pioneer electrical manufacturing organization studied intensively the causes of motor failure, shortened service life and high maintenance.

Almost invariably motors failed *mechanically* before they failed electrically! Hence, the F-M pioneering of *mechanical excellence!* Electrically, there is little to choose between standard types of motors of various makes—*mechanically* there is a world of difference.

Fairbanks-Morse pioneered the Ball Bearing motor as a mechanical means of adding longer service and reducing maintenance. It has pioneered design and manufacturing methods which in service records of scores of plants have proven the soundness of F-M superiority in mechanical construction.

The extra value built into these motors is at once evident to the motor-experienced executive who investigates. We shall be glad to send descriptive bulletins or arrange for actual demonstrations. Address Fairbanks, Morse Co., 900 S. Wabash Ave., Chicago, Ill. 32 Branches at your service throughout the United States.

Pioneer Designers and Manufacturers of POWER, PUMPING AND WEIGHING EQUIPMENT 104 Years

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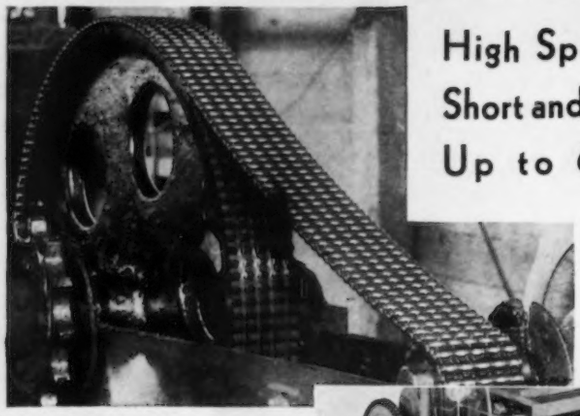
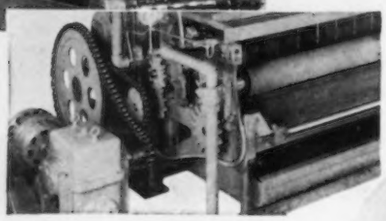
MOST UNIVERSAL OF MOTOR DRIVES



Main drive on foundry sand mixer, 20 hp., 1160 r.p.m. Diamond Roller Chain quintuple strand.

High Speed and Low,— Short and Long Centers,— Up to 672 H. P.

Four Diamond Chain drives are used on this cleaner.



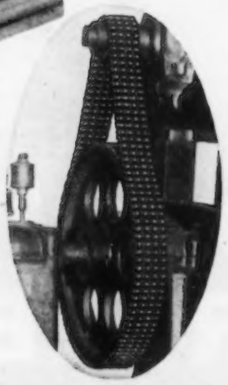
Below: Triple strand Diamond chain located between motor and grinder. Can be installed or removed without dismantling the machine.

DIAMOND Roller Chain Drives are efficient and economical for practically every power transmission problem in industry.

Thousands are operating at speeds up to *3600 R.P.M.*—many at even higher speeds. Crawling speeds and intermittent operation are also efficiently handled with Diamond from fractional horsepower capacities up.

Center distance is no obstacle, for chain drives are positive—continuously. Diamond Chains require much *less space per h.p. transmitted*, are simple to install—and easy to maintain.

Simplify *your* drive problems with Diamond Drives. Mail the coupon for the Stock Drive Book No. 78. DIAMOND CHAIN & MFG. CO., 433 Kentucky Ave., Indianapolis, Ind. *Offices and Distributors in All Principal Cities.*



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Wire Drawing at the Higher Speeds

(Concluded from Page 18)

held in fixtures, one above the other. The wire passes from below up through the centers of these spools and as it passes a rapidly rotating arm wraps the thread around it tightly. There are other types of winders, but the principle is the same in each.

There is a huge stranding or cabling division where numbers of bare or tinned copper wires are stranded together into flexible conductors which are then cotton, silk or rubber-covered. These stranding machines are of the conventional types with refinements added here and there. The cable for the automobile starter, as made here, contains 127 separate wires, and necessitates the use of a rather complicated stranding machine.

Process steam and steam for heating the plant is obtained from two separate boilers. These boilers are fired with gas burners and are automatic and continuous in operation. This is accomplished through a steam pressure control by which the fuel flow to the burners is shut off when the steam pressure rises above the point set on the indicator, and is restored when it drops back again. With an automatic water feed these boilers require no attention whatever.

Taken all in all, it would indeed be difficult to find a plant of this type so completely equipped with the modern and up-to-date machines, furnaces, ovens, etc., as is this plant.

Mixer for Laboratory And Process Work

FOR mixing chemicals and other materials in laboratory and in small process work, the Patterson Foundry & Machine Co., East Liverpool, Ohio, is offering the "Poromixer" here pictured. The tank is made of white acid-proof Porox glazed inside and out. The bottom, which is round, has a Monel metal outlet valve flush with

the inside of the bottom and is fitted with a nozzle so that the contents may be discharged in any direction.

The mixer is equipped with a Patterson direct drive Unipower agitator operating at 1200 r.p.m., single phase, 60 cycle, 100-volt, and is complete with panel board and switch. The vertical shaft and propeller type stirrers are made of Monel metal. The agitator can be removed in 2 min., the receptacle can be removed from its frame quickly and conveniently, and the mixer can be cleaned easily. Two sizes of the machine with total capacities of 6 and 12 gal. and operating capacities of 5 and 10 gal. respectively are available.

STAINLESS

...on the Side that is used

MILD CARBON STEEL on the other

The Borg-Warner Corporation has perfected and now produces IngAclad in the modern steel mills of its wholly-owned subsidiary . . . The Ingersoll Steel & Disc Company. A cladding of finest quality stainless steel is inseparably "welded in the ingot" onto mild carbon steel for the production of sheets and plates. By this simple method the possibilities for the use of stainless steel in all industries is vastly increased.

INGACLAD (Trade Mark Reg.)

STAINLESS-CLAD STEEL

provides all the utility advantages of solid stainless at a saving in material cost of approximately 50 per cent. For all industries where manufacturing processes demand the use of stainless metal as well as in those industries where its use would insure an improved product and lower manufacturing costs, IngAclad meets practically every requirement.

Write for special IngAclad folder and free Manual of Welding and Fabricating Procedures for IngAclad Stainless-Clad Steel.

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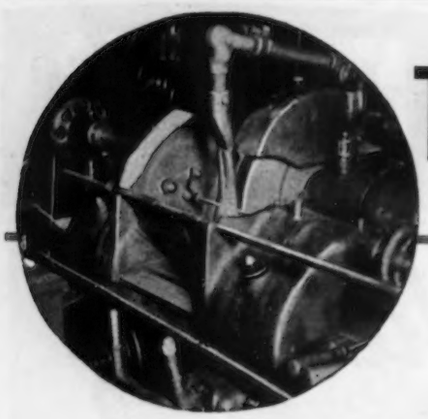
Chemical bleach tanks with water-jacketed conical bottoms entirely of all-welded IngAclad construction are used in soap works.

Economy and corrosion resistance dictated the use of IngAclad for this all-welded dryer in a leading chemical processing plant.

Flick Centrifugal Entrainment Separator made of IngAclad for large soap works.

"A Borg-Warner Product"



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SPEED UP PRODUCTION. Turn out better work. Lower production costs. These are ever-present challenges to industry. To men. To machines. And to the cutting and soluble oils you use.

How much real difference is there in cutting and soluble oils? You be the judge. Here are some actual performance records of what Socony-Vacuum Cutting and Soluble Oils have done.

A FIRE ARMS MANUFACTURER, working on 280 to 300 Brinnell steel, increased tool life 25%, 50% and 100%. Rejections, formerly 10%, nearly eliminated.

AN AIRCRAFT ENGINE MAKER, working on alloy steel, Brinnell hardness over .302, increased tool life 300%.

A MANUFACTURER OF AUTOMOBILE GEARS raised pieces per hour from 4.09 to 4.48—reduced cutter grinds 12.5%—raised pieces per grind from 49 to 60—reduced oil costs 68%.

A BOLT MANUFACTURER increased production on automatic nut tappers for 3/8" nuts, 125%; on 5/16" nuts, 165%; on 1/2" nuts, 49%; on 5/8" nuts, 64%.

A STEEL PLANT reports 50% longer die life on a cutting and stamping job.

A GUN MANUFACTURER had trouble with the pick-up of metal scoring gun barrels and breaking drills. With Socony-Vacuum Cutting Oils he eliminated the trouble and increased production 40%.

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Performance records like these are the grist of our daily work in solving the cutting and soluble oil problems for hundreds of users.

May we use these records as letters of introduction to you? A Socony-Vacuum representative will call at your request. Socony-Vacuum Oil Company, Inc., 26 Broadway, New York City.

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A MANUFACTURER working high Brinnell steels reports the following typical economies with Socony-Vacuum Sultran Cutting Oil: 1—Tolerances of plus or minus .0002 inches are being readily maintained on difficult threading and reaming. 2—Re-threading eliminated on a 300 Brinnell stud. 3—Longer tool life. 4—Fewer rejections. 5—Lower oil costs.

Socony-Vacuum Cutting and Soluble Oils, the S-V brand, occupy the same top position in their field as is enjoyed by the Gargoyle brand among lubricating oils.

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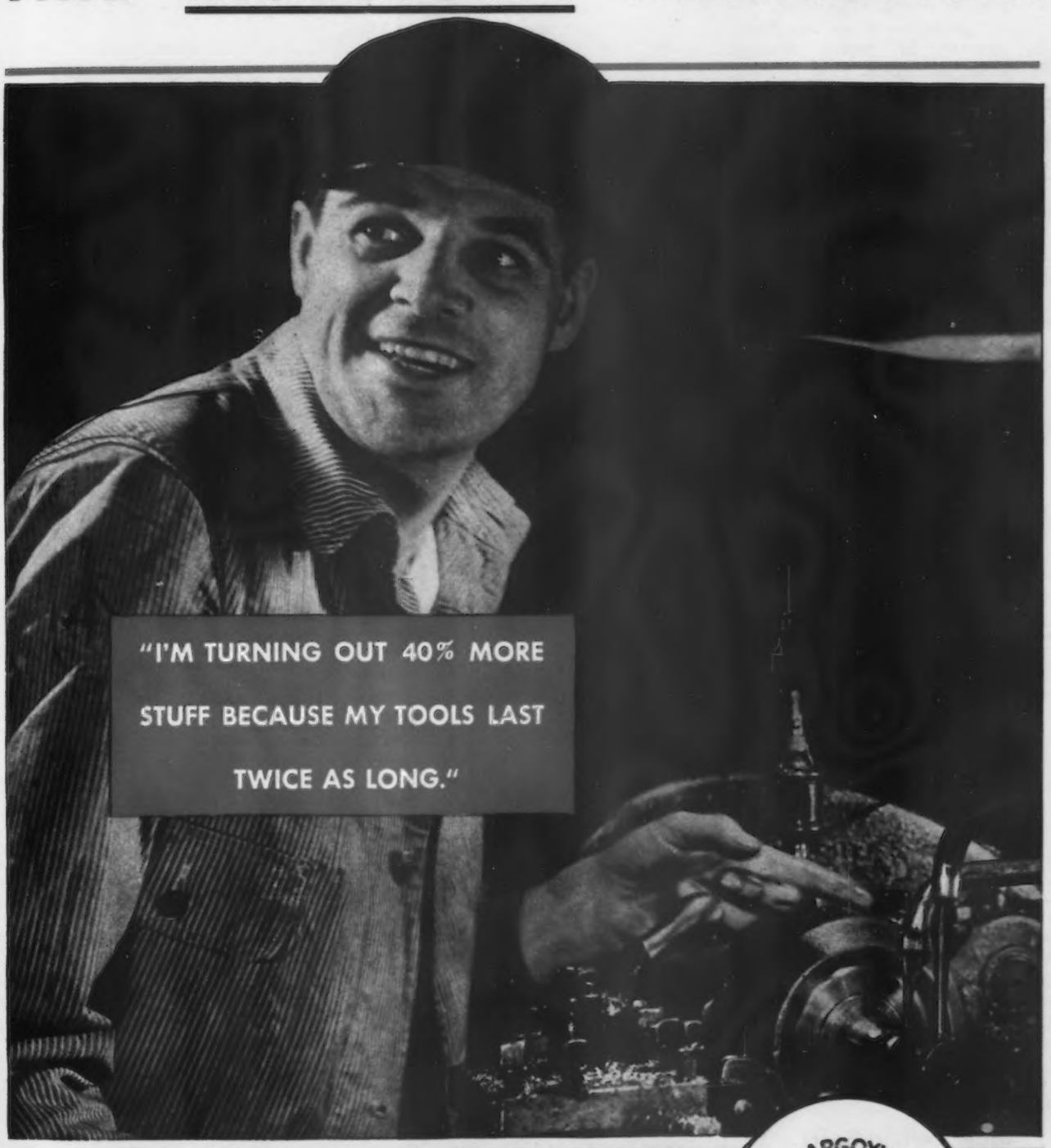
ARE INCREASING PRODUCTION!



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GARGOYLE
Lubricating
Oils

Car Underframes Made From Cast Steel

(Concluded from Page 13)

a negligible amount of sulphur. The physical properties range over 60,000 lb. per sq. in. tensile strength, 30,000 lb. per sq. in. yield point, 22 per cent elongation in 2 in. with 30 per cent reduction of area.

After cooling, the underframe castings are drawn from the mold and placed on air operated vibrating frames. The core sand is shaken out and the risers, gate, etc., are cut off with a torch, after which all small fins, etc., are roughly chipped off with air chisels. After final chipping a rigid inspection is made and the small cracks and imperfections are electrically welded in order to procure a smooth, unblemished surface. Only a small amount of machining is required to completely finish the underframe.

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Future Possibilities of Cast Steel

It is of importance to note that a greater use of cast steel for large, intricate structures is not under any kind of metallurgical limitation. For instance, the steel used for the underframes will reliably give a large safety factor, and, in fact, the sill webs (center ¾ in., side sill web 11/16 in. thick) could be made thinner with adequate strength. However, a reduction in thickness is regulated by simple laws of hydraulics. That is, the mold interstices must be large enough to permit the liquid metal to flow rapidly enough to fill the mold before the smallest spaces completely freeze. There is, of course, some opportunity of betterment along metallurgical lines, which is continually being pursued. But engineers at the General Steel Castings plant are especially concerned with refining and developing engineering designs and manufacturing methods.

As long as a number of products of complex and fairly compact design are required, the cast steel foundry will probably be in a preeminent position both on a price and on a physical efficiency basis. However, they are under an economic limitation regarding products having a large area-weight ratio.

The end-dumping single-piece mine car body shown in Fig. 3 illustrates about the economic limit to which founders can go with present molding methods. This body is cast in a conventional cope-drag manner with green sand, and the yield (metal weight as compared with sand volume necessary) is so low that the car cannot compete with built-up wood and iron cars when judged solely on an initial price basis. However, many other advantages which result in a lower lifetime aggregate cost justify their popularity.

It is this question of a definite economical ratio between sand and metal which is retarding the use of cast steel for making complete freight cars. At the present time it is metallurgically possible to cast strong and durable gondola and hopper cars complete (walls, bottom and underframe), but such a car could not be priced even near the conventional built-up rolled steel product.

The General Steel Castings designers and engineers, however, are fully confident that the next few years will witness the evolution of revolutionary molding tactics which should greatly reduce costs. If such improvements meet expectations the railroad field will probably be the most important battle ground for the supremacy of cast steel or welded rolled rustless steel. In any case the cast steel industry has initiated a one-part era wherein individual castings or individual plates will be cast as one piece or welded as one unit. Such constructions will eliminate many machining and assembling operations; there will be no parts to shake loose, alinement will be retained, and the compact mass-effect will dampen ruinous vibration to a great extent.

Standards Association Reaches Membership Peak

DESPITE the depression, the American Standards Association has reached an all-time peak in membership, according to Dr. P. G. Agnew, secretary. It has 42 member bodies and associate members and 1233 company members. The association is the national clearing house for standards and safety codes. It was formed in 1918 by five technical societies, which felt the need of developing inter-industry standards out of their own technical standards.

More than 250 codes have been developed by the association, and nearly 200 are under development or are being revised. Some 3000 engineers, scientists and industrialists, representing manufacturers, technical societies, consumers, and Government departments, serve on the numerous committees.

New company members which have joined since the first of the year include: E. I. duPont de Nemours & Co., Foxboro Company, Gilbert & Barker Mfg. Co., Wright Aeronautical Corpn., Fellows Gear Shaper Co., John Barth & Co., O. K. Tool Co., and the Carrier Corpn.

The Auto Steel Co., 10401 Woodlawn Avenue, Detroit, has been organized by Leo H. Marks, and will maintain offices and warehouses at the above address for the distribution of steel products.

Twist Drills

Knee Action Spring Rod

Axle Shaft

Pistons

Bolts

Rear Axle Housing

Better Centerless Grinding

. . a result of closer fitting NORTON WHEELS

What Makes One Wheel Work Better Than Another?

Abrasive and bond, grain and grade must of course be right but there is another important factor —the *arrangement* of abrasive, bond and pore space. Norton varies this arrangement—the wheel structure—to obtain the best grinding action for each job.

Can Structure Be Definitely Specified?

Yes. A special Norton process of manufacture makes it possible to vary the structure by definite steps just as are grain and grade. The different structures are designated by numbers—from No. 1 for close spacing of the grains to No. 12 for open spacing.

Are Slight Structure Changes Important?

Actual field experience shows that a one-step change in structure is often the whole difference between success and failure of the wheel.

Are There Other Special Norton Features?

A special type of bond, known as "B" bond is an important factor on all jobs where steels and steel alloys are being ground. Less "B" bond is required to produce a given grade of wheel —the result is a freer, cooler grinding action.

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BALANCED SPIRAL
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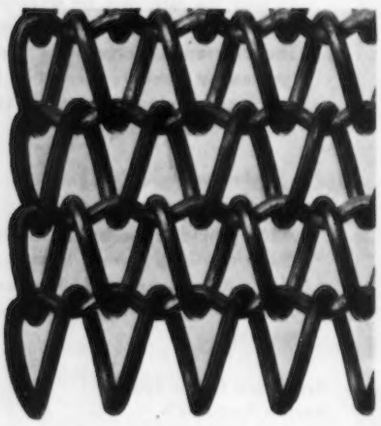
Solves many a conveyor belt problem . . .

In this NEW patented construction, the spirals of the belt are not woven into each other, but are connected by the crimped reinforcement member. The spirals are balanced . . . woven alternately right and left . . . resulting in a belt that always runs true and flat, does not elongate or shrink, and remains completely flexible. These exclusive advantages solve many a difficult belt problem and result in longer belt life. Learn more about it. Send for the new WISSCO Handbook on Conveyor Belts.



Wickwire Spencer Steel Company, 41 East 42nd Street, New York City; Buffalo, Chicago, Worcester; *Pacific Coast Headquarters:* San Francisco; *Warehouses:* Los Angeles, Portland, Seattle; *Export Sales Dept.:* New York City.

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JUST BETWEEN US TWO

Laid End to End, They Would . . .

AT the risk of reminding you of the fabled old maid who just liked to talk about it, we mention for the third time the unprecedented amount of publicity the newspapers gave The Iron Age's little news item about the strike vote in certain steel mills.

The flow of clippings continues to resemble Niagara after the Lord answered prayers for rain. Although The Iron Age is no stranger to the public prints, being quoted weekly in self-respecting newspapers, the calcium glare of the front page and editorial columns titillates us.

Let 'Em Suffer

THE New York *Times* carries a "Help Wanted—Male" ad for "Entertaining orchestra for roadhouse." That is laying it on a bit thick. If the members of the orchestra can't entertain themselves, let 'em yawn all evening along with the paying guests. Of course, it is tough on the piccolo player. You can't yawn and play the piccolo simultaneously. But he should have thought of that when he switched from the bull fiddle.

Call for Engineers

IN these days when there seems to be too much of everything but cash and rain, it is pleasing to hear Dr. Davis, Stevens Institute's president, predict a shortage of engineers in four years. The burden of proof rests mainly on a chart showing engineering graduates from all schools from 1920 to 1937.

In his youth did the doctor ever figure how he could become a millionaire in five years by investing in ten chickens and a rooster? Did he ever moon over a "How Savings Mount" chart showing how $15 a week soaked away regularly would put him on Easy Street at age 49?

But chickens get the pip and banks emulate Phil Baker's accordion. So if 1937 engineering seniors can walk peacefully across the campus without emissaries of our great manufacturers jumping from behind every bush and offering $10,000 contracts, we won't be surprised.

Extrapolations are all right if the status quo remains static, but it never does.

Blurb

IF the number of new subscribers put on in the first half of '34 did not exceed the number for the dark first half of '33, we would be pained, and doubtless fired. But all is well. The '34 figure is 57 per cent ahead.

Kindergarten Language from the Bench

MAYBE the fact that it isn't polite to argue with judges accounts for the prevalence of impressively asinine observations in judicial opinions. But here's the prize-winner, uttered by a New York State Supreme Court justice, in a caddy-golfer suit:

> *"A golf ball is ordinarily a harmless thing but when it is struck a hard blow by a golf club it assumes the nature of a dangerous missile."*

The old brain must have been fatigued after thinking that out.

Bouquet

"WE think *The Most Forgotten of Forgotten Men Speaks* (page 46, June 21 IA) states the situation of the small manufacturers more accurately than anything we have seen."—E. P. Sedgwick, President, Chicago Hardware Foundry Co., North Chicago, Ill.

Bridge Work

REQUESTS for the solution of the "Whitfield Six" bridge problem published here May 24 swamped us. When we get three more the total will run into two figures. As the remainder of this column's certified total of eight readers was probably too lazy to write in, we volunteer the hint that if South leads the club jack and plays the eight of clubs from the North hand, then trumping a spade in North hand, and leading the last heart, the opponents will be embarrassed.—A.H.D.